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JUN 11 1948

CONTENTS

PAGE

A Study of Selected Participants and Non-Participants in a Program Directed Toward the Development of Initiative and Good Citizenship: *John A. Bath* 161

Testing for Grade and School Differences Among the Scores of Home Economics Students: *William Dowell Baten and Hazel M. Hatcher* ---------- 176

General and Specific Factors in Reading Comprehension: *A. Sterl Artley* ---- 181

The Appeal of Information About Occupations: *Lester Nicholas Recktenwald* 187

On Establishing Norms in a Large City System: *Harry L. Stein* ---------- 192

The Reading Habits of Superior College Students: *Ralph C. Preston and Edwin N. Tuft* ---------- 196

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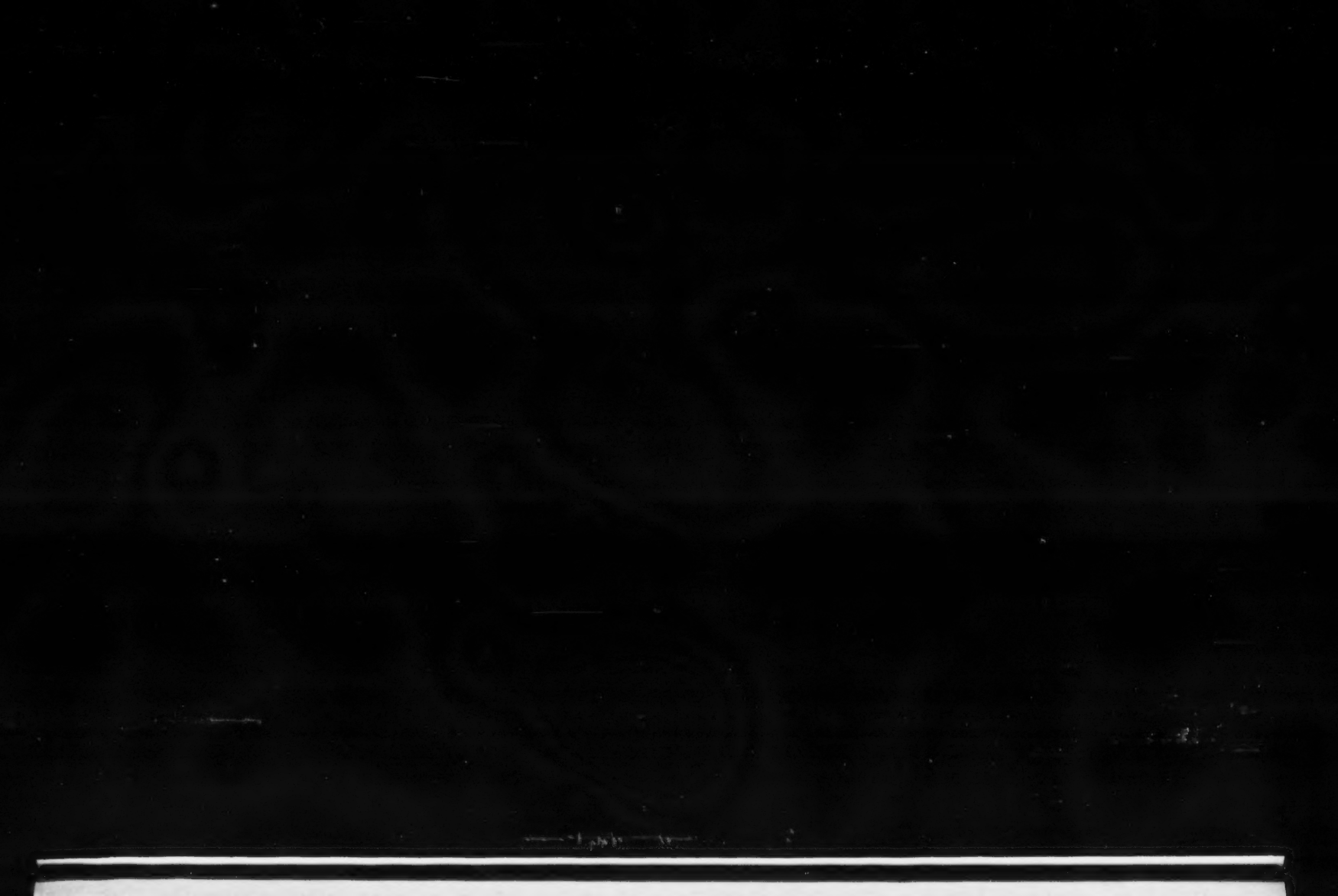

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A STUDY OF SELECTED PARTICIPANTS AND NON-PARTICIPANTS IN A PROGRAM DIRECTED TOWARD THE DEVELOPMENT OF INITIATIVE AND GOOD CITIZENSHIP*

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INTRODUCTION

A great deal of material has found its place in the educational literature pertaining to ways and means of carrying on citizenship and leadership training as a part of, or in conjunction with, the school program. Unfortunately, very little has been done in the way of evaluation of programs pointed toward such training. The present study was an attempt to make an evaluation of a specific program which was designed to encourage and develop those traits which, in a broad sense, were believed to be primary components of good citizenship. The technique used was that of studying the products of the program as compared to the non-participants. To do this, a restricted case study method was applied to two different groups of matched subjects. The subjects were former students of the Lincoln, Nebraska, Junior High Schools where such a program as indicated above was in operation.

HOW IS GOOD CITIZENSHIP DEVELOPED?

The development of good citizens has always been one of the foremost objectives of education in the United States. Ways of attaining this objective have long been a matter of some difference of opinion both among school people and the lay citizenry. Some contend that the development of good citizenship can best be brought about through a broad educational program in the schools. This influence has been seen in recent years in the general trend toward diversification of the curriculum, providing more extensive activities in both the academic and non-academic areas. Others believe such training can be provided more completely through some special type of program. Such programs are not always a required part of the school experience of every child but they are commonly sponsored by, and operated in conjunction with, the schools.

Mahan[1] found that whereas civics courses were the chief curricular means of getting at the problem of citizenship, actually they fell far short of the goal. As a measure of the value of such courses he attempted to determine the specific characteristics of citizenship by asking 280 representative citizens to name the duties, difficulties and qualities of a good citizen. When he canvassed 350 high school students, who had had a course in civics, for their opinions regarding the characteristics named by the adult citizens, there was little relationship.

Training for citizenship is frequently interpreted in a restricted sense as helping the individual to discover, evaluate and put into action such practices as are deemed to show allegiance to one's country. A much broader interpretation would suggest that, in addition to the above, whatever society as a whole considers to be the desirable qualities to be possessed by its members the development of those traits is a part of training for citizenship. Generally speaking it is the latter interpretation which the school people of America have chosen in building their programs of citizenship. The comment of Bonser[2], although made several years ago, reflects what seems to be the accepted notion today of the school's part in this training. He says:

> "Citizenship means personal responsibility for the well-being of all as well as opportunity for personal freedom in doing whatever is desirable providing this does not interfere with the equal freedom of anyone else. It means restraint as well as liberty."

*This study was done under the direction of D. A. Worcester, University of Nebraska.

[1]Thomas Jefferson Mahan, An Analysis of the Characteristics of Citizenship (New York: Teachers College, Columbia University, 1928).

[2]F. G. Bonser, Elementary School Curriculum (New York: The Macmillan Company, 1921), p. 399.

Others have suggested that the principal purpose for which citizenship training is provided is the development of constructive leadership or followership. By far the greater emphasis has been placed upon producing leaders. The activities of the schools have tended to place the emphasis in this direction. Jones[3], in writing about the education of youth for leadership, expresses the following reaction:

> "---we cannot escape the conclusion that in our schools as now constituted there are appreciable numbers of potential leaders--a far larger proportion than ever achieve real leadership in later life. This represents an incalculable loss to society, a loss that can be materially reduced if the proper measures are taken."

It is not quite clear from Jones' statement whether he charges the schools with failure to ferret out their potential leaders or whether he is suggesting that society has failed to provide sufficient opportunities in order that the potential leaders can develop. Whatever the interpretation, there is no mistake about the importance which he attaches to the schools' responsibility for development of leadership. An examination of the literature on citizenship provides much support for Jones' position.

Typical evidence that considerable attention is being paid to the part school programs play in citizenship development is found in the publication of the Educational Policies Commission, Learning the Ways of Democracy.[4] The Commission reports the survey made of ninety American secondary schools for evidence of democratic citizenship. A description is provided of numerous situations in which these schools are carrying on activities designed to equip students at the high school level for helpful citizenship in the community.

Mahan[5] made an extensive study of the characteristics of citizenship. After reviewing definitions of good citizens and citizenship supplied by several of the nation's leading educators he concluded:

> "The school is considered to be one of the most important agencies for producing good citizens. It is the task of the school to determine first of all what are the characteristics of good citizenship, and then to select such traits as should be taught by the schools in order that it may train in those socially desirable activities --those duties which all individuals are called upon, in their lives as citizens of a democracy, to perform."

Traits of the so-called good citizen are legion. Although there might be some uniformity in agreement as to what the most important traits are, there would surely be disagreement as to the rank order of their importance. Such a situation suggests that school authorities are left more or less to their own discretion in determining how the separate components of citizenship are to be provided to best advantage in the school program. However, there are numerous studies on what constitutes citizenship together with suggestions for ways of developing it.

It would seem, then, there is general agreement that citizenship training should hold an important place in the school program. Separate programs which are intended to reach beyond the usual bounds of citizenship and provide training in a host of related traits have found a place in numerous school systems. Many such programs have been carried on under the assumption that they are valuable additions to the school program. Many have become mechanical in their method of operation and few attempts have been made to evaluate their procedures or outcomes.

In the total survey of literature the one study which is most like the present one in problem and procedure is that of Courtenay.[6] She was interested in determining to what degree leadership persists into post-high-school years. She used the technique of paired groups of women. One hundred members of the leadership group had gained distinction during their high school career by

[3]Arthur J. Jones, The Education of Youth for Leadership (New York: McGraw-Hill Book Co., Inc., 1938), p. 27.

[4]Educational Policies Commission, Learning the Ways of Democracy (Washington, D.C.: National Education Association, 1940).

[5]Thomas Jefferson Mahan, Op. Cit., p. 3.

[6]Mary Ethel Courtenay, "The Persistence of Leadership", School Review, XLVI (1938), pp. 97-107.

their leadership activities; the control group was composed of a similar number who had evinced interest and cooperation in the affairs of the school community but had held no important positions of leadership. The graduates were those of a single high school between the years 1922 and 1934. Those in the leader group had established their claim to distinction as leaders by merit of having been elected to the senior girls' council. The election was the result of the vote of the entire senior class with the approval of a faculty committee. The council, limited to eighteen girls, was largely responsible for the administration of girls' interests in the school. Pairings were made on the basis of socio-economic background, ethnic heritage, scholarship rating and age at graduation. The data were collected by means of questionnaires and investigation of high school records.

Briefly, the findings of the study were these: (1) the leadership exhibited in early years had a definite tendency to persist, (2) the averages of activity and distinction through major offices and special honors for the leaders and non-leaders in high schools stand in the relation of 7.9 to 0.9, (3) a similar relationship for those in both groups who continued their study in institutions of higher education is expressed by averages of 5.5 and 1.5, (4) in the community life of post-school years the leadership of the two groups assumed a ratio of 4.7 to 1.1.

THE PURPOSE OF THE PRESENT STUDY

For purposes of this study it is not necessary to set down in so many words the definition of a good citizen. The activities engaged in by the participants in the program under study represent what the builders of the program considered important to the development and encouragement of habits which would result in good citizenship. Instead of questioning whether these activities are the ones rated as most important by the experts the plan was to measure something of the permanence of the traits reputed to have been employed.

The subjects of this study were students who had had an opportunity to participate in a special program designed to develop citizenship characteristics. The program is known as the Efficiency Program. It developed as one phase of the Junior Civic and Industrial League which is the self-governing body of the junior high schools of Lincoln, Nebraska.

PLAN OF THE EFFICIENCY PROGRAM

Broadly speaking the Efficiency Program is intended to develop and encourage initiative and good citizenship in junior high school girls and boys. It was originally started in the upper elementary grades, but following the establishment of junior high schools in Lincoln its operation was restricted to that unit of the school organization. The Program, having undergone changes from time to time, had been operating in the Lincoln junior high schools for twenty-eight years when this study was made. It is only that phase of the Junior Civic and Industrial League known as the Efficiency Program with which this study was concerned. The Chamber of Commerce (formerly the Commercial Club) and the junior high schools of the city have sponsored jointly the Efficiency Program.

In a bulletin which explained the plan of the Efficiency Program, M. C. Lefler, Superintendent of the Lincoln Public Schools, made the following statement:

> "The suggestions contained in this bulletin are intended to stimulate and encourage individual initiative on the part of junior high school boys and girls.
>
> "A wide range of worthy activities provides for the differing interests of junior high school pupils, and enables them to give free expression in the direction of their needs, abilities and aptitudes. Efficiency, as here intended does not imply a high degree of polish, but rather clear-cut evidence of developing traits. Industry, initiative, enthusiasm and integrity are regarded as fundamental characteristics. Of course, matters affecting health and physical fitness are of primary importance.
>
> "Worthy citizenship and helpful community service are constant goals of each school. The efficiency program emphasizes these aims and provides a means of discovering and training the boys and girls of each junior high school to assume active leadership in the school and community."

The Efficiency Program is introduced to the pupils upon their entering the junior high school

in the seventh grade. A pupil, in order to secure an efficiency certificate, should have been a member of the Lincoln Junior High Schools three semesters. However, a pupil who enters before the close of the six-weeks period in Grade 9-B may be permitted to earn a certificate upon recommendation of the school principal and with the approval of the Director of the Bureau of Child Welfare.

Following were the requirements for the efficiency certificate at the time of this investigation:

1. Credit must be earned in 30 units listed under Activities with not more than five credits in any one of the ten major divisions, one of which must be in certain health activities. (The ten major divisions of activities are: health-safety; school leadership; school service; citizenship; community service; industry, vocations and civic information; fine arts; special interests; practical arts; group participation.)

The majority of the activities which are outlined are in connection with the school program, but several home and community activities are also included. No credit is awarded for an activity in which school credit is earned. Homeroom teachers, principals, sponsors of activities and teachers or directors of special activities are responsible for deciding whether credit shall be granted. If credit is granted it is so indicated by the teacher in charge recording the grade, date and her initials opposite the activity on the activity record. Recommendation for credit may even come from the parent in rare instances. In all, about 150 different activities are listed through which efficiency credit may be earned. Typical of some of the activities through which efficiency credit may be earned are the following: (1) posture, (2) chairman of a committee from a class or a club, (3) classroom assistant, (4) a member of an election board, (5) upkeep of public property, (6) savings and investment plan, (7) writing a play, (8) first place awards at state fair, 4-H club, hobby shows, etc., (9) personal account system indicating wise use of money, and (10) member of a homeroom team. Definite standards were established for each activity and credit for the activity must be judged and authorized by the sponsor, a classroom teacher, a homeroom teacher, principal or other responsible person.

2. In addition to the activity requirements, the pupil must meet an achievement standard on an individual basis equal to or greater than his estimated learning ability based on a chart provided by the Department of Measurements and Research. That standard must be maintained three out of the last four semesters.

3. Certain character trait ratings are required. A pupil must twice be rated by his homeroom and classroom teachers. Three-fourths of his ratings for the semester must be "plus" or "satisfactory," with not more than half of the ratings on any one trait being "minus." (A "plus" rating indicates especially good development of a trait; a rating of "s" stands for satisfactory development of a trait; "minus" indicates need for improvement of the trait.) The first rating of character must be made at the close of Grade 8A, with a provisional rating at 9B and the final rating in 9A. Smoking automatically disqualifies a pupil.

4. An additional requirement is that a letter must be written by the pupil to the Superintendent of Schools and to the Secretary of the Chamber of Commerce on a subject of civic interest.

5. Final approval for the efficiency certificate is made by the Director of the Bureau of Child Welfare.

GENERAL PLAN OF THE STUDY

As mentioned earlier, the technique of matching was applied in this study. Individuals from two groups who had been awarded an efficiency certificate were paired with individuals from two groups who had not been awarded such a certificate. It seemed advisable to study two different groups of efficiency and non-efficiency persons in order to note what changes, if any, had been demonstrated in outcomes of the program over a period of two decades. One group of individuals was selected from the four eighth-grade promotion groups for the school years 1921-1922 and 1922-1923, and another group from the promotion groups of three junior high schools in June, 1941. Because the junior high school organization was not yet complete at the time the older group was in elementary school, certificates were issued at the conclusion of the eighth grade. At that time,

most of the efficiency activities were in Grades 7 and 8 with a few extending down into the 6th grade. Individuals of the younger matched groups were awarded efficiency at the close of the junior high school period, over which period of time they had opportunity to meet the necessary requirements.

Throughout the remainder of this study the 1921-1922 and 1922-1923 graduates will be designated as Groups O_1 and O_2 (the older group). The 1941 groups will be referred to as Groups Y_1 and Y_2 (the younger group). In both the younger and older groups, the subscript "1" identifies those who were awarded efficiency certificates while subscript "2" identifies those not receiving the certificate.

PLAN OF MATCHING FOR OLDER GROUPS

The principal basis on which matchings were made were (1) year of promotion from eighth grade (within a two-year span), (2) sex, and (3) school marks earned in Grades 7 and 8.

Only men who were still living in Lincoln were matched for the study of this older group. Such a restriction seemed advisable for three reasons. First, since personal interview was believed to be the only satisfactory method of gathering much of the data, it was necessary to restrict the investigation to subjects yet living in Lincoln. Second, the problem of locating the girls, the majority of whom would have been married, would have been most difficult because of change in names. Third, much of the information used for evaluation purposes was related to the individual's occupation. Inasmuch as many of the girls, following marriage, would have confined their attention largely to housekeeping duties with varying opportunities for participating in civic affairs, inclusion of girls did not appear to be advisable for the purposes of this study.

While grades were the best single means by which the individuals could be matched, the number of pairs that could be made was quite limited in view of the close matching used. A scale of grades for the Group O_2 individuals ran considerably lower on the average than did those of the Group O_1 individuals. For the sixty men from the four promotion groups who were still living in Lincoln, a satisfactory match could be found for only eighteen. That is to say that the grades for the remaining forty-two were enough higher than any in the O_2 Group as to make further pairing inadvisable.

While socio-economic status and age are frequently included as bases on which matched pairs of individuals are formed, neither was included in this study. Rather, the investigator was interested in discovering whether these factors were causative in obtaining an efficiency certificate. This would not have been possible had such bases been included.

SOURCES OF INFORMATION RELATIVE TO GROUPS O_1 AND O_2

A variety of sources was investigated in an attempt to get as complete information as possible about the subjects in the older group. These sources included (1) school records, (2) Lincoln city directory, (3) personal interviews, (4) teachers and principals, (5) Nebraska Credit Company, (6) juvenile court records, (7) municipal court records, and (8) Council of Social Agencies.

As might be expected, the interviews provided the most illuminating information. By this technique such data were obtained as regards (1) amount of education, (2) number of occupations engaged in since leaving school, (3) unemployment, (4) marital status, (5) extent of participation in civic organizations, (6) church affiliations and activities, (7) financial support given to church and welfare organizations, and (8) recollections of the Efficiency Program.

In addition to the data relative to past school activities, and the school records of these individuals over that range of grades in which the Efficiency Program operated, it was believed desirable to learn something about the earlier school activities of the subjects. That is, in order to measure the permanent effects of the Efficiency Program it was necessary to find out what characteristics were being displayed prior to their participation in the program by those individuals who were awarded efficiency certificates. It was believed that how well pupils were remembered and what was remembered about them should be valuable information in investigating the question of persistence of traits. This type of information was obtained by interviewing elementary school

teachers and principals who were associated with the schools during the latter years of the subjects' elementary school training period. While this information is subjective in nature, the teachers were not advised that a study was being made relative to the Efficiency Program. They were merely asked to recall as much information as they could pertaining to every pupil on the promotion lists of the two years under study. In addition to such evaluations as scholarship, citizenship, leadership and character these teachers and principals provided general impressions of their former pupils in many other respects.

From the Nebraska Credit Company such information was gathered as concerned present occupation, occupational stability, approximate income and general reputation for meeting obligations.

The records of both the juvenile and municipal courts were checked for evidence of instances of behavior which came into conflict with the law. The executive secretary of the Community Chest and Council of Social Agencies permitted each of the subjects to be cleared through the Social Service Exchange.

THE PLAN OF MATCHING FOR YOUNGER SUBJECTS

A somewhat different plan of pairing was used for the younger group. Twenty-eight pairs were made, each consisting of an efficiency and a non-efficiency pupil of which thirteen pairs were males and fifteen were females. The basis for matching, in addition to the fact that all were promoted to senior high school in June, 1941, included (1) sex, (2) race, (3) junior high school attended, and (4) I.Q. on the Henmon-Nelson Test of Mental Ability.

The 28 pairs were selected from the three junior high schools which send students to Lincoln High School. Selections from these three schools were made only because of the convenience of interviewing all pupils at one high school which draws its pupils from these schools. The number of pairs selected from each junior high school was approximately in the same proportion as the number of promotions from each of these schools.

No individual was chosen for matching purposes whose I.Q. varied more than 10 points on two different forms of the Henmon-Nelson Test of Mental Ability. No person was paired with another unless the average I.Q. ratings agreed within four points. Over half of the pairs either agreed exactly or varied no more than one point of I.Q.

Socio-economic status was considered in the matching only insofar as pupils were matched with others from the same junior high school. Although there are exceptions, each junior high school in this study draws from a rather different socio-economic section of the city.

SOURCES OF INFORMATION RELATIVE TO GROUPS Y_1 AND Y_2

Data on the younger group were collected from three sources: (1) school records, (2) interviews with subjects, and (3) interviews with former elementary school teachers of the subjects.

The data obtained from the school records were used mainly in the matching process. However, such information as pertains to occupations of parents was obtained from the records and will be cited later.

The primary purpose of the interview with the younger individuals was to record observations and opinions of a recent group regarding the functioning of the program. It was believed that this group, having been out of junior high school less than a year, would still have rather detailed recollections of the program, and now that the program was past history for them it was hoped that a free expression of opinion might be obtained. It was explained to the pupil that a study was being made of the Efficiency Program and that his cooperation was being solicited in this evaluation. In most instances merely mentioning the name Efficiency Program was sufficient to recall it to the pupil's mind regardless of whether or not he had participated in it. He was assured that the information was confidential and he was encouraged to express his honest opinions about the program. Several questions were asked regularly of every subject, but each was also provided an opportunity for free expression in regard to the program.

The purpose for which the elementary teachers of these individuals were interviewed was essentially the same as for the older group; that is, to get some subjective measurement of traits which the pupils were displaying prior to entrance into junior high school. In this series of interviews information was obtained only for the 56 pupils rather than for the entire promotion group from which the paired groups were selected. However, these teachers were not told which pupils were awarded efficiency certificates and which ones were not so awarded.

DATA PERTAINING TO THE OLDER EFFICIENCY AND NON-EFFICIENCY GROUPS
(Groups O_1 and O_2)

Data from school records. - Although individuals were not paired with respect to age, it was found that there was but one month of difference in the mean ages of individuals in Groups O_1 and O_2 at the time of promotion from the eighth grade. The mean age at promotion of O_1 persons was 14-4 while that of O_2 persons was 14-3.

All but two individuals in each group lived with both parents throughout their elementary school period. Those four lived with the mother only.

English was listed as the mother tongue of all but two of the O_1 persons and of all but one of the O_2 persons. German was the mother tongue of the two in the first instance and Italian was listed as the mother tongue of the one individual in Group O_2.

The O_1 persons represented six different elementary schools. The O_2 persons came from ten different schools.

Occupational status of parents of O_1 and O_2 individuals and occupational status of the individuals of those groups. - For purposes of this study a simple scale for rating occupations, adaptable to use with small groups, was desired. Beckman's[7] scale appeared to meet the requirements best. His scale was built to indicate the rank of an occupation on the basis of the intelligence, capacity or skill, education and training required for its pursuit, at the same time reflecting the socio-economic prestige attached to it. These factors are particularly useful when applied to the school situation. All occupations in this scheme come under five main classes or grades as shown in Table I. This table shows the occupational ratings of parents of individuals in Groups O_1 and O_2 at the time their children were finishing grade school. Inspection of the table reveals that there was little difference between occupational ratings of parents of these two groups. What slight advantage there was seemed to be in favor of the O_1 Group. No professional, managerial, or executive occupations were represented for parents in either group. Likewise, the occupational ratings of the subjects in Groups O_1 and O_2 show only a small difference. Those in Group O_1, however, ranked slightly higher on the occupational scale. It is interesting to note that individuals in both Group O_1 and O_2 tended to rate higher on the occupational scale than did their parents. Of all the individuals in Group O_1, over half were in occupations accorded a higher rating than their parents' occupations in 1922 or 1923 while of the O_2 Group less than half ranked higher in the occupational scale than did their parents. Only four of the O_1 persons and two of the O_2 persons were found to be following the same occupation as their fathers'.

Occupational stability. - The individuals of Group O_1 were considerably more stable in their occupations than were the O_2 individuals. Over one-third of the O_1 Group had been engaged in the same occupation since leaving school, while only one-sixth of the O_2 Group could claim a similar record. Only one O_1 person had been in his present occupation fewer than five years, while that is true of over one-third of the O_2 persons.

Comparisons of occupational stability are shown further by the number of major jobs held since leaving school. A major job was considered as one in which a person was engaged a minimum of one year. In Group O_1 more individuals had been engaged in a single major job than all other number of jobs combined. Aside from one individual in Group O_1 who had held as many as ten jobs and another who had held five, no other individuals in this group had held more than three jobs. The modal number of jobs held by individuals of Group O_2 was two, but only three were still pursuing the same work they had begun following school. In Group O_1 only one person had been unemployed for any considerable length of time and he for six months. Over one-third of Group O_2

[7] R. O. Beckman, "A New Scale for Gauging Occupational Rank", Personnel Journal, XIII (1934), pp. 225-233.

TABLE I
OCCUPATIONAL RATINGS OF PARENTS OF SUBJECTS IN FOUR GROUPS AND OF THE SUBJECTS IN GROUPS O_1 AND O_2

	O_1 Parents	O_2 Parents	O_1 Group	O_2 Group	Y_1 Parents	Y_2 Parents
1. Unskilled Manual	1	2	0	2	0	2
2. Semi-skilled	3	3	2	1	6	13
3. Skilled and white collar	6	7	5	7	8	6
4. Sub-professional	7	5	8	6	9	5
5. Professional	0	0	3	2	5	2
6. Occupation Unknown	1	1	0	0	0	0
TOTAL	18	18	18	18	28	28

TABLE II
ELEMENTARY SCHOOL TEACHERS' RATINGS OF SUBJECTS IN GROUPS Y_1 AND Y_2

	Group Y_1		Group Y_2			Group Y_1		Group Y_2	
SCHOLARSHIP	No.	%	No.	%	LEADERSHIP	No.	%	No.	%
Above Average	15	54	10	36	Constructive	17	61	8	28.5
Average	7	25	13	46.5	Destructive	0	0	2	7
Below Average	3	10.5	4	14	None Displayed	8	28.5	17	61
Not Reported*	3	10.5	1	3.5	Not Reported*	3	10.5	1	3.5
TOTAL	28	100.0	28	100.0	TOTAL	28	100.0	28	100.0
CITIZENSHIP					GENERAL RATING				
Good	19	68	20	71.5	Outstanding	13	46.5	7	25
Average	6	21.5	2	7	Mediocre	10	36	13	46.5
Poor	0	0	5	18	Unpromising	2	7	7	25
Not Reported*	3	10.5	1	3.5	Not Reported*	3	10.5	1	3.5
TOTAL	28	100.0	28	100.0	TOTAL	28	100.0	28	100.0

*Not remembered by any teacher or did not attend Lincoln elementary schools.

TABLE III
SENIOR HIGH SCHOOL TEACHERS' CHARACTER AND LEADERSHIP RATINGS OF SUBJECTS AFTER ONE SEMESTER IN HIGH SCHOOL

	Superior		Inferior	
	Group Y_1	Group Y_2	Group Y_1	Group Y_2
Courtesy	11	3	1	2
Dependability	15	9	2	8
Honesty	4	5	0	1
Initiative	8	2	0	1
TOTAL	38	19	3	12

	Constructive		Destructive	
	Group Y_1	Group Y_2	Group Y_1	Group Y_2
Leadership	6	2	0	3

had experienced unemployment ranging from one month to two years.

Economic status. - Yearly income in 1942 ranged from $720 to $2100 in Group C_2 and from $1200 to $3000 in Group C_1. The median salary for both groups was $1800, but more persons in the O_1 Group drew larger salaries and fewer had as low salaries as individuals in Group O_2. However, the mean salary of the persons in Group O_1 and Group O_2 was $1913 and $1634 respectively.

Educational status. - The individuals of Group O_1 attended school longer, one-third of them having been granted the B.S. degree and one having received both the A.B. and LL.B. degrees. One-sixth of the persons in Group O_2 received B.S. degrees or their equivalent and, of these, two completed M.A. degrees. Five in Group O_2 as compared with four in Group O_1 left school before completing the twelfth grade.

Marital and family status. - All but two members of Group C_1 and all but three of Group O_2 were married. One person in the O_1 Group had been divorced and remarried. In the O_1 Group the modal number of children was one; in the O_2 Group the modal number was two. There were the same total number of children in each of the two groups.

Participation in church and welfare. - Slightly less than three-fourths of the members of Group C_1 were members of a church, whereas every individual in Group O_2 was a member. Of the members of Group C_1 about half said they attended church fairly regularly but seldom contributed their services to the church work. About the same proportion of the members of Group O_2 participated to the same extent. Two individuals in Group O_1 took a very active part in church work in that they had responsibilities such as serving on a church board, whereas such responsibilities were being taken by three in the O_2 Group.

Contributions of money to church and various welfare groups during 1941 indicated that members of Group O_1 are somewhat more philanthropic. This might be expected, however, in view of the higher earning power of these individuals. Also their higher average occupational rank might have had the influence of greater pressure being brought for contributions to welfare organizations. The Group O_1 individuals' range of contributions was from $2 to $175 with a median of $50. The range in Group O_2 was from $1 to $65. The median was $20. Only one person in Group C_2 contributed a larger amount than the median amount contributed by members of Group O_1.

This particular sampling of individuals indicates that while O_1 individuals gave more financial support to worthy causes, the C_2 persons were more likely to belong to a church and they were at least the equal of O_1 individuals with respect to special responsibilities in the church.

Five individuals from the O_1 Group and two from Group O_2 had participated in drives or campaigns for such organizations as Community Chest, Red Cross and Salvation Army.

Reputation for meeting financial obligations. - According to the ratings given by the Nebraska Credit Company, two-thirds of those in Group O_1 had a satisfactory credit rating as compared with half of Group O_2. An equal number in each was described as being slow in meeting financial obligations. Two of Group O_1 and five of Group O_2 individuals were described as having unsatisfactory credit ratings.

Conflicts with the law. - Members of Group O_1 apparently had been more law-abiding than those of Group O_2 if number of arrests is a valid index of that trait of citizenship. Twenty-two per cent of Group O_1 had been in conflict with the law once each, whereas about thirty-nine per cent of Group O_2 had been brought before the court. Of the latter group almost half had appeared on more than one charge. In each case the majority of arrests made were for traffic offenses, but in the latter group charges were brought for intoxication, malicious destruction of property and fraud.

Membership and participation in civic organizations. - In post-school life, have those individuals who were awarded efficiency certificates demonstrated a sense of civic responsibility? Some clues to the answer to this question were sought by inquiring into membership and leadership in various civic organizations. Only those organizations which were usually considered as performing public services were included in the listing. Most of them were of the nature of service clubs. Lodges, unions and business or professional organizations were excluded.

In Group O_1 slightly more than one-third of the individuals, at the time the study was made, held memberships in civic organizations. Enough others had been members of such groups some-

time in the past to bring that proportion to two-thirds. Of those active at the time the data were gathered one-sixth had some special duty in the organization in the way of officer, board of directors or committeeman. The tendency seemed to be for those who participated in such organizations to be active in more than one.

In Group O_2 slightly more than one-fourth held memberships and two others had been members previously, so that of this group about forty per cent were participating or had participated in the past. Only two of this group had special duties or responsibilities in their organizations.

Recollections of the Efficiency Program. - One measure of the value of an activity might be assumed to be the recollections which people have of the activity. Upon the assumption that meaningful experiences are usually retained, the investigator inquired during each interview whether the Efficiency Program was in operation when the subject was in school. Usually a brief description was given of the activities included in the program in order to aid the subject in identifying it. If the subject remembered such a program he was not questioned as to whether he was awarded an efficiency certificate.

The evidence gained from this sampling from both groups indicated that participation in the program had little effect upon remembering or not remembering it. Half of those who had received certificates stated definitely that no such program was in operation at the time they were in school. This meant of course that they did not remember having received a certificate. Of those persons in Group O_1 who remembered the program, four said that they had not received certificates. A like number of those who received the certificate remembered having received it. Of those in Group O_2 about half had some recollection of such a program. An equal number could remember nothing of such a program.

The effect of prohibiting smoking. - It will be recalled that no boy who smoked was entitled to an efficiency certificate even though he met all other requirements. Since the purpose of such a rule was to discourage smoking, an effort was made to determine whether or not the habit was present when the study was made. It was found that only two persons in each group did not smoke. Apparently such a rule was not effective in discouraging smoking.

Social service exchange and juvenile court records. - Investigation of the records of the juvenile court revealed that none of the individuals in either group had ever been brought before that court.

The clearing of names through the Social Service Exchange revealed that in only one instance was help given which was on a relief basis. This was for a person in Group O_2, but was of minor significance inasmuch as the aid provided was for a short period of time.

Teachers' recollections of former pupils. - In order to obtain evidence relative to the kind of individuals the subjects were prior to their introduction to the Program, interviews were held with former elementary teachers and principals of all pupils in the four promotion groups from which individuals were selected for this study.

Although principals and teachers in ten different schools were interviewed, it was not possible to obtain information for every pupil in every school because in a few instances no teacher or principal was available when the data were gathered who taught in those particular schools. The teachers, at the time of the interview, were unaware that comparisons were to be made later with respect to people who had earned or had not earned an efficiency certificate.

From the ratings which teachers provided relative to scholarship, leadership, citizenship and character plus other comments which they frequently made in providing a more complete description of former pupils, ratings were assigned by the writer to those who, from the descriptions, appeared to merit ratings as outstanding individuals. Of the entire list, tabulations were made to determine which were and which were not later awarded efficiency certificates. In every instance a considerably larger percentage of Group O_1 than Group O_2 pupils were remembered as being outstanding. Also a tabulation was made of the numbers from both groups who were not remembered by their teachers. With only two exceptions a larger percentage of O_2 than O_1 pupils were forgotten.

These data for the promotion groups were further analyzed with respect to the pairs of indi-

viduals with whom a detailed study was being made. The contrast between the two groups was marked. All but one of the O_1 pupils were remembered as having displayed leadership in grade school. On the other hand only one of the O_2 persons was remembered as a leader.

Almost three times as many of the individuals in Group O_1 as those in Group O_2 had been good citizens in grade school as judged by their teachers and principals. Only one of Group O_1 as compared with four of Group O_2 were judged as having been poor citizens. Every O_1 pupil was remembered as having been of good character, whereas three of Group O_2 were judged as having been of poor character.

These data provide evidence that O_1 persons as a group were exhibiting those traits assumed as necessary for the efficiency award before their participation in the program.

DATA PERTAINING TO THE YOUNGER EFFICIENCY AND NON-EFFICIENCY GROUPS (Groups Y_1 and Y_2)

Thirteen pairs of boys and fifteen pairs of girls who were promoted from three Lincoln Junior High Schools in June, 1941, were the subjects for this phase of the study. Data were gathered from three sources, namely (1) school records, (2) interviews with the pupils, and (3) interviews with the former elementary school teachers of these pupils.

Data obtained from school records. - As was the case with the older groups, school records for the younger group were used mainly for matching the pairs of individuals. As mentioned earlier, the available data from this source revealed that for the older group, the efficiency persons were older by one month than the non-efficiency pupils. In the case of the younger groups the findings were reversed. On the average, individuals of Group Y_2 were two months older than those in Group Y_1. It appears that this difference was not great enough to suggest that the age factor had any influence upon whether or not a pupil earned an efficiency certificate.

While it was more usual than not for there to be a difference in the occupational rank of parents, this difference for any given pair tended to be a small difference. The data in regard to parents' occupational rank is summarized in Table I. As in the case of the older group, Beckman's[8] scheme for determining occupational rank was used.

What differences there were in occupational grade of parent tended to be in favor of Group Y_1. Exceptions were that for one pair the occupation of the parent of the Y_2 pupil ranked two grades higher; in four other pairs there was a difference of one grade in favor of the parent of the Y_2 pupil. For eight pairs the occupational rank of parents agreed exactly. In fifteen pairs the advantage was in favor of parents of Y_1 pupils, ranging from one grade to three grades higher. There were twice as many parents of pupils in Group Y_1 whose occupational rating was either grade four or five (sub-professional and professional occupations) as there were in the same two grades in Group Y_2. There were no Grade 1 (lowest ranking) occupations for parents of Group Y_1, and less than half as many in Grade 2 occupations as was found for parents in Group Y_2.

Interview data. - The pupils interviewed were sophomores in Lincoln High School and at the time of the interviews had completed a semester of high school work.

After something of the purpose of the interview had been explained the pupil was asked if he had participated in the Efficiency Program and whether or not he was awarded a certificate. This question was followed by asking why each had or had not worked for the certificate.

A variety of reasons were given by members of Group Y_1 why they had worked for the certificate, and an almost equal number of reasons were given by members of Group Y_2 why they had not worked for the certificate. In order of frequency of response the following reasons were given by Group Y_1: (1) honor, (2) valuable in later life, (3) goal to work toward, considered part of work, and influence of brother, sister or friends, (4) influence of parents, and (5) popular thing to do. Three reasons are given under number three above since each of these was listed an equal number of times by the interviewees.

[8] R. O. Beckman, Op. Cit.

In reviewing the reasons given by Group Y_2 it seemed that in some few instances there was a tendency for the pupil to rationalize. It was difficult to tell in all sintances whether the pupil was completely reassured that he was not being criticized for having failed to earn a certificate. Many of the responses were conventional reasons given for failing to participate in a given activity. In this instance it seemed natural that the student might have tended to give an easy explanation for his failure to work for a certificate, such as not being interested in the project. In order of frequency of response to this question the following reasons were given: (1) not interested, (2) tried, but had too few credits, (3) believed it was not worthwhile, (4) did not investigate the program, (5) lost interest, and (6) the work was too hard or unfair.

The most outstanding impression which the investigator gained from the conference was the lack of information which these pupils had about the Efficiency Program. Several of those in Group Y_2 admitted that they knew very little about the activities in the program or how it operated, and many of the pupils in Group Y_1 did not understand very well the principles on which the program operated. But they did recall that it was necessary to acquire 30 credits in order to be awarded a certificate.

Extent to which program encouraged new activities. - An activity program is usually assumed to be creditable because it either encourages new activities or perhaps helps to direct old activiites in a more meaningful manner. The program is intended to encourage initiative on the part of junior high school boys and girls. The information gained through the interviews throws some light upon such a supposition.

Approximately two-thirds of the individuals in both groups reported their belief that the efficiency program caused pupils to do only a limited number of things which they would not have done otherwise. About one-eighth of the pupils believed the program caused one to pursue numerous new activities. Nearly one-fifth of the two groups said credits were earned almost wholly by pursuing the usual activities.

Even though there is much variety in the plan of activities in the Efficiency Program, and a given number of credits must be earned in each group of activities, the above findings seem to indicate that in the majority of cases pupils earned credit doing the things they think they would have done anyway had such a program not been in operation.

Closely related to the question discussed above was one which was directed only to the individuals in Group Y_1. Each was asked how much extra effort he expended working for a certificate. Over half reported "slight" or in similar descriptive terms.

Students' estimates of value of the efficiency program. - As might be expected, more individuals in Group Y_1 than those in Group Y_2 estimated the value of the program in such terms as "considerable." However, a majority of the pupils in Group Y_2 also believed it had considerable value. Six in Group Y_2 assigned no credit whatsoever to the program, while only one in Group Y_1 made such a statement. Such a response might be expected in view of the fact that those in Group Y_2 may not have earned a certificate because they did not try for credits and therefore might not have been qualified to judge the value of the program.

In addition to providing a general judgment of the value of the program the subjects were asked to enumerate specific values. Many of the suggested values were so general as to be meaningless. Pupils had considerable difficulty, for example, in explaining what they meant by "it makes you more efficient." There was considerable tendency for a pupil to recall certain requirements when suggesting values. The person who suggested "it causes a person to maintain better posture" had probably been impressed by the stress placed upon this particular item in the health group. Those who suggested that "it encourages one to keep up his grades" were most likley thinking specifically of the requirement that pupils must work up to their estimated learning ability.

The stated purposes of the program -- encouragement of initiative, leadership and citizenship -- were mentioned by several in a variety of ways. If initiative implies a motivating force, then the development of initiative would rank number one among the values suggested. Fully half of the values suggested were in the nature of incentives although only one person suggested that the program encouraged initiative as such. Not one mentioned leadership as such, but six suggested that one learns to handle responsibility. Four said participation encouraged good citizenship and it was noted that, taken together, most of the other reasons implied good citizenship. One interesting observation is the fact that two people in Group Y_2 suggested that participation in the program

should help in deciding upon a vocation. This value was not given by any person in Group Y_1. This is a bit surprising inasmuch as one of the ten groups of activities in which credit may be earned refers to industry, vocations and civic information.

Weaknesses in the program suggested by the pupils. - Those who had been awarded efficiency certificates were most critical of the program. The explanation for this may lie in the fact that those who were awarded certificates had more experience with the program on which to base their comments. On the other hand, those who lacked a few credits of having enough for efficiency may have hesitated to express their honest criticisms for fear their comments would be used in some way against them.

The criticism that credits were too easy to earn was given most often. Rating second among weaknesses was the charge that insufficient information was provided early in the junior high school period about the program. Many times a pupil got well along in his school program before he learned what the program was about. Aside from these two criticisms the remainder were diverse in nature and, in some cases, it appeared that the reasons given almost amounted to pet peeves on the part of the individual concerned. Although other criticisms were mentioned by one or two individuals they probably should not be regarded as unimportant since they furnish additional clues as to pupils' feelings about such a program. Following are additional comments made regarding weaknesses of the program:

1. Pupils should be reminded of its activities more often to avoid last minute rush to earn credits.
2. Same standard is not maintained by all teachers in judging whether credit should be given.
3. Pupils too often chosen for a task because they needed credit in that particular area.
4. Creates jealousy between those working for efficiency and those not working for it.
5. There should be more things that everyone can do.
6. The activities should be linked more closely with the school.
7. A set number of credits should not be required in every area.
8. Opportunities to pass some tests should not be restricted to one trial.
9. Program just isn't appealing.
10. Letters to the superintendent of schools and to the secretary of the chamber of commerce should be the original work of the pupil.
11. Pupils are not encouraged to earn more than the required number of credits.
12. The number of credits should be reduced and those left should be made more difficult.
13. Credit is not always restricted to things done during junior high school.
14. Credit should not be given for work that is an honor to perform.
15. Credits are too easy.
16. Pupils' report of work done is frequently accepted without investigation.
17. Teachers push certain students; others are forgotten.

Elementary school teachers' ratings. - As in the case of the older group an answer was sought to the question whether those qualities of a pupil which the efficiency certificate is considered to represent were being exhibited prior to participation in the program. To get a partial answer to this question teachers and principals of the pupils concerned were interviewed.

The fifty-six pupils in the younger group had attended twelve elementary schools. As far as possible, teachers were interviewed who had these pupils in Grades V and VI. Since it is the usual practice to have more than one teacher for a given grade it was often necessary to contact two or more teachers in each school. Information was obtained from twenty-three teachers and principals. As was the practice in the case of the older group, teachers did not refer to records but provided a brief description of each child as he was remembered.

Table II is a summary of the data obtained from these twenty-three teachers and principals. Information was obtained for twenty-five of those in Group Y_1 and for twenty-seven of those in Group Y_2 out of a total of twenty-eight in each group. One pupil in Group Y_1 was not remembered by any teacher contacted, possibly because frequent moves on the part of this pupil made it difficult for a teacher to form a lasting impression. Information could not be obtained for the other two two in Group Y_1 and for one in Group Y_2 because they did not enter the Lincoln schools until Grade VII.

While scholarship has been found to be an important trait of leaders, it probably is not as important in this study as those traits and actions which describe a person's display of civic responsibility. It is interesting to note, however, that although individuals were matched for general intelligence, the persons in Group Y_1 had apparently made better use of this aptitude as judged by the ratings in scholarship given by the elementary teachers. It is also possible that the halo effect was operating here.

From the standpoint of leadership over twice as many of Group Y_1 as of Group Y_2 were exhibiting that trait in elementary school. None in Group Y_1 were rated as destructive leaders. Over twice as many in Group Y_2 as in Group Y_1 had failed to display leadership of any type.

Ratings as good citizens were about equal for the two groups. There were none rated as poor citizens in Group Y_1 but five in Group Y_2 were so rated.

The general rating appearing in Table II represents a composite of scholarship, leadership and citizenship ratings. This subjective rating was arrived at by taking those pupils who had ranked above average in scholarship, constructive in leadership and good in citizenship and classifying them as outstanding for a general rating. Likewise, those who ranked average in scholarship and average in citizenship were given a mediocre general rating, and so forth. The general rating of outstanding shows approximately a two to one ratio in favor of Group Y_1. A few more of Group Y_2 than Y_1 were rated as mediocre, but over three times as many Y_2 as Y_1 were rated as showing little promise for developing into a good citizen by the elementary teachers.

Senior high school character and leadership records. - As mentioned previously the pupils in this phase of the study had been in Lincoln High School for one semester, long enough to have received one rating on traits of character and leadership. The traits upon which high school teachers rated their pupils are indicated in Table III. A report was not made by a teacher if an average display of any given trait was exhibited. Only superior and inferior ratings are made on the four traits of character and ratings of constructive and destructive on leadership.

A comparison between the totals for the two groups shows an advantage in every trait with the exception of honesty for those in Group Y_1. Exactly twice as many ratings of superior were given to those of Group Y_1 as of Group Y_2, whereas four times as many in Y_2 as in Y_1 were given ratings of inferior in the character traits.

It should be noted that very few ratings on leadership were given. This is likely due to the fact that, having been in high school only one semester, there had been insufficient opportunity to display leadership characteristics for a rating to be given by a teacher. It is possible that the ratings for a single semester do not properly indicate the trend of differences between the groups since a period of adjustment is necessary for most pupils upon entering high school. Whether the adjustment problems for both groups would be the same in intensity is difficult to say, but on the basis of past performance one would judge that Group Y_1 should be more capable of rapid adjustment. If this is true, the ratings at the end of the first semester would tend to be a more accurate

measure for Group Y_1 than for Group Y_2. But it must be remembered that, on the average, Y_1 people had demonstrated traits in elementary school which distinguished them as the more promising individuals.

SUMMARY

1. A majority of pupils who were awarded efficiency certificates had already demonstrated outstanding qualities of leadership and citizenship in elementary school.

2. Those awarded efficiency certificates were superior to those not so rewarded in the majority of respects in which comparisons were made. They had better jobs, were more stable in their occupations, had a better reputation for meeting their financial obligations, came into conflict with the law less frequently, contributed more to church and welfare organizations and continued their education longer.

3. The rule prohibiting those who smoked from receiving a certificate did not result in abstinence from the habit in later life.*

4. As judged by recollections of the program on the part of those who had been awarded certificates twenty years prior to the investigation, the program activities did not leave lasting impressions.

5. The occupational rank of parents of the two older groups investigated differed but little. Parents of the younger groups showed a difference of almost one full grade on an occupational rating scale in favor of parents of efficiency award recipients.

6. The general feeling amongst members of the younger groups was that the Efficiency Program was valuable. Nevertheless, they were quite critical of its operation. Two-thirds of the subjects believed the Program caused pupils to engage in only a limited number of activities which they would not have engaged in otherwise. To them, it seemed more a matter of reporting activities engaged in and seeing that credit was recorded.

CONCLUSION

While the results of this study show that, in general, those persons who were awarded efficiency certificates were more responsible citizens, the differences between the efficiency and non-efficiency groups were not particularly outstanding. If it had been possible to match pairs even more closely, considering such factors as family income, home training, companions, siblings, language spoken in the home and amount of travel differences might have been even less significant. Perhaps the greatest value which results from a program such as the one under study here is the incentive which it furnishes to the pupil to enlarge the scope of his experiences and to achieve generally on a higher level. It is important to note that those who participated in this program and who were awarded an efficiency certificate, generally speaking, had exhibited earlier in life the traits the Program was designed to develop.

It is the belief of the writer that the general technique of evaluation as employed in this study might be used with profit in evaluating other programs purported to develop initiative and desirable citizenship traits.

*Disqualification for the efficiency award because of smoking has been eliminated since this study was made.

TESTING FOR GRADE AND SCHOOL DIFFERENCES AMONG THE SCORES OF HOME ECONOMICS STUDENTS

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The purpose of this analysis is to determine (a) whether or not there is a significant difference in the academic achievement of eleventh and twelfth grade students in the same homemaking class and (b) the variability of schools with respect to such a difference. A four-week unit in consumer buying was taught at the senior high school level in four schools in St. Paul and Minneapolis. The objectives for the unit were agreed upon by the teachers who participated and the same method was followed throughout; that is, the teachers and pupils together decided how best to work toward their objectives and together checked pupil accomplishment as the unit progressed. Different types of evaluation were used such as a pencil-and-paper test, diaries, case studies and anecdotal records but this analysis is based upon the pencil-and-paper test which proved to have a reliability of .91 when used as the final examination for 250 students.

Table I contains the scores made by the eleventh and twelfth grade students in the four consumer buying classes, together with their I.Q. scores. An ordinary analysis of covariance is not sufficient for analyzing these data, since there were not the same numbers of eleventh and twelfth grade students in each class. To give proper weights to the averages made by the students in the different schools and grades it is necessary to fit constants to the data.[1]

Let it be assumed that the score of any student depends upon the grade and school she is in and upon her I.Q. Let - G represent the effect of being in the eleventh grade (the effect of being less mature than twelfth grade girls), + G be the effect of being in the twelfth grade and let S_1, S_2, S_3, and S_4 represent respectively the effects of the four schools. Let b be the regression coefficient pertaining to the I.Q. and the final score in the course. Let Y_{ijk} represent the score of the k th student in the i th grade and in the j th school. According to these assumptions

$$(1)\quad Y_{ijk} = \pm G + S_j + bx_{ijk} + E_{ijk}$$

Where X_{ijk} is the I.Q. of the k th student in the i th grade and the j th school and E_{ijk} is the corresponding residual error which cannot be attributed to grade, school or I.Q. The sign of G is minus if the girl is in the eleventh grade and plus if in the twelfth.

The sum of the squares of the residual errors is

$$(2)\quad E = \sum (Y_{ijk} \mp G - S_j - bx_{ijk})^2,$$

where the summation takes in the final scores of all students. This assumption indicates that interaction, grade x schools, is negligible. By minimizing the sum of the squares of the residual errors the following six simultaneous equations arise

$$\begin{aligned}
(3)\quad 111G+ \quad & 38_1 + 138_2 - 48_3 + 98_4 + 2{,}325b = 875 \\
3G+ \quad & 318_1 + 0S_2 + 0S_3 + 0S_4 + 3{,}233b = 1{,}082 \\
13\,G+ \quad & 0S_1 + 418_2 + 0S_3 + 0S_4 + 4{,}465b = 1{,}611 \\
-4\,G+ \quad & 0S_1 + 0S_2 + 188_3 + 0S_4 + 1{,}918b = 679 \\
9\,G+ \quad & 0S_1 + 0S_2 + 0S_3 + 218_4 + 2{,}337b = 903 \\
2{,}325\,G+ \quad & 3{,}238_1 + 4{,}465_2 + 1{,}918_3 + 2{,}337_4 + 1{,}295{,}099b = 463{,}247
\end{aligned}$$

These equations may be solved directly for the values of G, S_1, S_2, S_3, S_4, and b or as will now be explained. Let the following six equations in the unknowns C_{11}, C_{12}, C_{13}, C_{14}, C_{15}, C_{16},

[1] G. W. Snedecor, and Gertrude M. Cox, Disproportionate Subclass Numbers in Tables of Multiple Classification, Research Bulletin No. 180 (Ames, Iowa: Iowa State College).

F. Yates, "The Principles of Orthogonality and Confounding in Replicated Experiments," Journal of Agricultural Science, XXIII (1933), p. 108.

TABLE I

The I.Q. scores and scores made by eleventh and twelfth grade girls in home economic classes in four high schools. (X = I.Q. scores, Y = home economics scores.)

Eleventh Grade								Twelfth Grade							
Schools								Schools							
A		B		C		D		A		B		C		D	
X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
94	39	91	22	123	42	116	47	114	39	115	35	99	27	112	38
103	40	108	35	108	39	111	43	88	32	107	40	109	44	108	45
92	13	112	46	114	30	122	43	112	42	121	37	107	40	103	35
93	34	118	51	105	39	103	43	99	32	91	38	86	29	118	53
101	38	106	47	106	33	104	45	108	40	112	47	112	43	127	45
109	45	107	46	98	32	130	40	100	36	121	36	102	45	109	39
99	31	108	50	109	32			102	30	109	44	108	39	103	47
105	30	101	41	99	39			110	40	126	49			109	43
113	32	120	42	123	47			112	46	108	42			113	45
94	28	112	34	109	40			106	31	104	44			92	35
103	36	114	33	101	39			108	31	103	40			106	41
108	36	107	34					113	38	100	27			105	45
97	30	104	38					105	32	120	39			112	45
110	43	104	33					109	31	113	39			116	46
								103	32	113	42			118	40
								107	32	114	34				
								116	43	105	40				
										103	42				
										121	40				
										121	40				
										112	40				
										111	39				
										104	39				
										93	35				
										106	27				
										101	37				
										99	47				

be written

$$
\begin{aligned}
(4)\quad & 111C_{11} + 3C_{12} + 13C_{13} - 4C_{14} + 9C_{15} + 2{,}325C_{16} = 1. \\
& 3C_{11} + 31C_{12} + 0C_{13} + 0C_{14} + 0C_{15} + 3{,}233C_{16} = 0. \\
& 13C_{11} + 0C_{12} + 41C_{13} + 0C_{14} + 0C_{15} + 4{,}465C_{16} = 0. \\
& -4C_{11} + 0C_{12} + 0C_{13} + 18C_{14} + 0C_{15} + 1{,}918C_{16} = 0. \\
& 9C_{11} + 0C_{12} + 0C_{13} + 0C_{14} + 21C_{15} + 2{,}337C_{16} = 0. \\
& 2{,}325C_{11} + 3{,}233C_{12} + 4{,}465C_{13} + 1{,}918C_{14} + 2{,}337C_{15} + 1{,}295{,}099C_{16} = 0.
\end{aligned}
$$

It will be noticed that the coefficients in equations (4) are the same as the coefficients in equations (3) and that the constant terms in the right hand members of equations (3) have been respectively replaced by 1, 0, 0, 0, 0, 0. The solution of equations (4) gives values of C_{11}, C_{12}, C_{13}, C_{14}, C_{15}, and C_{16}. Another set of six simultaneous equations can be set up in the unknowns C_{21}, C_{22}, C_{23}, C_{24}, C_{25}, and C_{26} by using the coefficients in equations (3) and the constants in (3) respectively replaced by 0, 1, 0, 0, 0, 0. Another set can be set up in the unknowns C_{31}, C_{32}, C_{33}, C_{34}, C_{35}, and C_{36} by using the coefficients in (3) and the constants 0, 0, 1, 0, 0, 0. Similarly a set in C_{41}, C_{42}, C_{43}, C_{44}, C_{45}, and C_{46}, a set in C_{51} and a set in C_{61} (where i runs from 1 to 6). These six sets of simultaneous equations in six unknowns were solved with the following results:

C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}
.009'825'071'98,	.002'031'89727,	- .000'000'649'28,	.005'230'845'34,	.001'027'965'75,	- .000'028'600'07
C_{21}	C_{22}	C_{23}	C_{24}	C_{25}	C_{26}
.002'031'897'27,	1.536'879'909'07,	1.570'723'041'07,	1.537'955'350'61,	1.604'885'074'31,	-.014'429'128'54
C_{31}	C_{32}	C_{33}	C_{34}	C_{35}	C_{36}
-.000'000'649'28,	1.570'723'041'07,	1.664'576'798'08,	1.604'839'647'93,	1.676'081'282'59,	- .015'061'061'66
C_{41}	C_{42}	C_{43}	C_{44}	C_{45}	C_{46}
.005'230'845'34,	1.537'955'350'61,	1.604'839'647'93,	1.628'595'607'01,	1.639'413'825'14,	- .014'751'719'03
C_{51}	C_{52}	C_{53}	C_{54}	C_{55}	C_{56}
-.001'027'965'75,	1.604'885'074'31,	1.676'081'282'59,	1.639'413'825'14,	1.760'488'012'32,	-.015'387'675'09
C_{61}	C_{62}	C_{63}	C_{64}	C_{65}	C_{66}
-.000'028'600'07,	.014'429'128'54,	.015'061'061'66,	- .014'751'719'03,	- .015'387'675'09,	.000'138'381'93

R. A. Fisher (1) has shown that G, S_1, S_2, S_3, S_4, and b can be found from the C's. These values are

$$G = 875C_{11} + 1{,}082C_{21} + 1{,}611C_{31} + 679C_{41} + 903C_{51} + 463{,}247C_{61}$$

$$S_j = 875C_{1j} + 1{,}082C_{2j} + 1{,}611C_{3j} + 679C_{4j} \quad 903C_{5j} + 463{,}247C_{6j}$$

$$b = 875_{16} + 1{,}082C_{26} + 1{,}611C_{36} + 679C_{46} + 903C_{56} + 463{,}247C_{66}$$

where j takes values from 2 to 5. When these relations are employed the following values are obtained for the unknowns in equations (3)

$G = .168'999'924'88$, $S_1 = 4.349'187'285'50$, $S_2 = 7.350'872'582'84$,

$S_3 = 6.558'867'618'55$, $S_4 = 10.341'466'602'45$, $b = ..292'813'623'28$

The reduction in the sum of the squares of the scores of the students about the mean of all scores which is due to the fitting of the constants, G, S_1, S_2, S_3, S_4 and b is found from part of the standard error of estimate of the scores about the linear relation (1). This reduction is found as follows:

$$(D.F.)\sigma_e^2 = \Sigma (Y - \overline{Y})^2 - 875G - 1{,}082S_1 - 1{,}611S_2 - 679S_3 - 903S_4 - 463{,}247b$$

$$(D.F.)\sigma_e^2 = \Sigma\ 4{,}591.73 - 1{,}487.43,$$

where (D.F.) represents the degrees of freedom in the expression for the standard error of estimate and σ_e is the standard error of estimate. The reduction is the sum of squares due to grades, schools and regression coefficient is 1487.43. This quantity enables us to find the sum of squares due to the interaction of grades and schools. The following table shows this interaction sum of squares:

TABLE II

Analysis of covariance of final scores in these homemaking classes.

Source of variations	D.F.	SS(X)	SS(XY)	SS(Y)	SS of estimate	D.F.	M.Sg
Total	110	7,943.96	2894.98	4591.73	3536.79		
Between classes	7	1,129.80	838.00	891.88			
Within classes-error	103	6,814.16	2056.98	3699.85	3078.91	102	30.18
Between classes	7				457.88		

The error sum of square after taking out the effect of differences between classes and I.Q's is 3,078.91 as found in the sixth column in the error line in Table II. This quantity is the remainder after the sums of squares due to grades, interaction of grades and schools, schools, and regression pertaining to I.Q.'s have been taken from the total sum of squares of scores. The difference between this quantity and the total sum of square 4,591.73 is 1,512.88, this is the totality of the sum of squares of the effects of grades, schools, interaction of grades and schools and I.Q. The sum of squares due to the constants G, S_1, S_2, S_3, S_4 and b is 1487.43 which does not include the sum of squares due the interaction of grades and schools. The difference between these last two values is 25.39 and is the sum of squares due to the interaction of grades and schools.

The sum of squares due to the differences between school means is found by fitting to the data constants pertaining to grades and regression concerning I.Q.'s. In this case the score of the h th student in the i th grade is

(5) $y_{ih} = g_i + b'x_{ih} + e_{ih}$ where i = 11 and 12.

By the method of least squares

$g_{11} = -.861'401'255$, $g_{12} = -.053'440'912$, $b' = .361'188'836$.

The reduction in the total sum of squares due to grades and I.Q.'s is

$g_{11}\,(1,700) + g_{12}\,(2,575) + b\,(463,247) = 1,072.38$.

Since the reduction in the total sum of squares due to grades, schools and I.Q.'s was found to be 1487.43 the difference between 1487.43 and 1072.38 = 415.05, is the sum of squares due to schools when allowances are made for different sizes of classes and I.Q.'s.

The sum of squares due to the differences between grades is found by fitting to the data constants pertaining to schools and regression concerning I.Q.'s. In this case the score of the k th student in the j th school is

(6) $y_{jk} = s_j + b''x + e_{jk}$

where j = 1, 2, 3, 4.

By the method of least squares

$s' = 4.314'192'897$, $s'_2 = 7.350'886'101$, $s'_3 = 6.468'781'650$,

$b'' = .293'306'533$, $s'_4 = 10.359'153'018$.

The reduction in the total sum of squares due to schools and regression pertaining to I.Q.'s is

$s'_1\,(1,082) + s'_2\,(1,611) + s'_3\,(679) + s'_4\,(903) + b''(463,249)$

$= 1,484.97$.

The difference between 1487.43 and 1484.97 = 2.46 and is the sum of squares due to grades when allowances for different sizes of classes and I.Q.'s are made. Table III contains the final analysis of variance of these data.

TABLE III

Final analysis of variance of the scores of the students

Source of variation	D.F.	SS of estimate	Mean Square	F
Between grades	1	2.46	2.46	
Between schools	3	415.05	138.35	4.58
Interaction-GxSch.	3	25.39	8.46	
Error	102	3,078.91	30.18	

According to Table III there is no significant difference between the eleventh grade and the twelfth grade averages. This means that the eleventh grade girls do about as well in these home economics classes as the twelfth grade girls. There is a significant difference between at least two school averages. The F-value in Table III for schools, 4.58, indicates that differences between school averages are highly significant.

R. A. Fisher[2] has shown that the variance of the differences $d = s_i - s_j$ is

$$V(d) = [C_i - 2C_{ij} + C_j]\sigma^2,$$

where V represents variance and σ^2 is the error mean square in Table III. The variance of $d = s_1 - s_4$, is

$$\begin{aligned} V(d) &= [C_{22} - 2C_{25} + C_{55}]\,30.18 \\ &= [1.536'879'909'07 - 2(1.604'885'074'31) + 1.760'488'012'32]\,30.18 \\ &= 2.626. \end{aligned}$$

The t-value for this difference is

$$t = \frac{4.349'187'285' - 10.341'466'602}{\sqrt{2.626}} = 3.72$$

which shows that the girls in school D are superior to those in school A. Differences between other school averages can be tested similarly.

SUMMARY

This article has shown how to analyze data when the numbers in the "cells" or classes are not the same. This was accomplished by fitting constants to the data. This statistical technique showed that eleventh grade girls were about as good in home economics courses as twelfth grade girls and that there were significant differences between schools. These school differences may have been largely due to teacher differences.

[2] R. A. Fisher, Statistical Methods for Research Workers, 4th Edition (Edinburgh: Oliver and Boyd, 1932).

GENERAL AND SPECIFIC FACTORS IN READING COMPREHENSION

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It is axiomatic to state that reading is one of the chief avenues to learning in American schools. During the last decade school practitioners and research workers have evidenced an increasing awareness of the nature and extent of the reading problem. A great deal of this attention has been directed to the problem of the development of the reading skills, habits, and attitudes essential to successful participation in the several content areas of both the elementary and secondary curricula.

In general, school policies in relation to the provision made for the development of these basic or work-type reading skills have varied between two points of view. At the one end of the continuum is the point of view that the basic reading skills are general in nature, and, as a result, should be developed by the reading or English teacher. At the other end is the point of view that these skills are specific in nature and should be developed under the guidance of the "subject" or content area teacher. Between these extreme points of view lies another which holds that the basic skills are both general and specific, and that the reading or English teacher is vested with the responsibility for developing the basic or generalized skills, abilities, and attitudes, while the other teachers are charged with the responsibility of applying to their specific content area those basic language learnings, as well as developing those skills, abilities, etc. that seem uniquely related to their own instructional field.

Certain basic assumptions which may or may not be entirely valid underlie each of these points of view. Those who hold to the first assume that the factors which make for reading comprehension are general, and by virtue of that fact, are common to several areas. Hence, "ability to organize", for example, is generic, and, accordingly, one who is able to organize in terms of the main and subordinate points in fifth grade geography would be able to carry on equally well when he crossed the hall to his science class. As a result reading instruction may be effectively provided in a class designed to develop these general skills.

Likewise, those who hold the belief that reading skills are specific in nature assume that the reading pattern varies with the content areas, as well as to the purposes for which one comprehends within that area. In other words, this assumption would lead us to believe that history, for example, has its own constellation of factors that make for successful comprehension, while chemistry might have another group. Moreover, the fact that one ability appears to apply to several content fields, may mean that it is alike in name only; functionally it may be entirely different. This would mean that the particular ability could hardly be developed and made to operate effectively in one area as a result of instruction given in another. Neither would we be justified in testing for the presence or absence of this skill in a particular content field by a test that was designed to measure "general comprehension".

Those who hold to the merits of the approach that both general and specific reading instruction have a place in the functional program do so on the assumption that there may be less difference in the reading abilities themselves than in the difference to which students transfer these abilities from one content field to another. Said another way, there may be less difference between the ability to interpret seventh grade history and seventh grade math, for example, than there is in the extent to which pupils transfer this ability from the place where instruction is given to the place where the skill is to be used. Consequently, each teacher is accountable for making the necessary application of this "generalized" ability to his particular area.

Several pieces of research provide clues as to the validity of the assumptions mentioned above. Shores, [1] working with a group of ninth grade children, made a study of the skills involved in the ability to read history and science. He found that the ability to read sceince materials related in a significant manner to such factors as science vocabulary, general vocabulary, ability

[1] James H. Shores, The Ability to Read Historical Materials as Related to Eighth-Grade Achievement and General Reading Ability (unpublished Master's thesis, University of Minnesota, 1938).

to read graphs, charts, and tables, and the ability to understand details. In like manner he found certain factors such as paragraph comprehension, understanding of details, and grasp of total meaning entering into the ability to read history materials. He also compared the skills involved in the reading of these two basic subjects with those required in reading literary type materials, and found that neither was significantly related to the latter. Shores concluded that "by the time students have reached the ninth grade, reading proficiency is to a considerable extent specific to the content field in which the reading is done. To speak of general reading ability of ninth grade students without description of the content field in which reading is done is unwarranted... The ability to read scientific and historical materials holds unique and different relationships to a number of reading skills."

Treacy,[2] using seventh graders, studied the relationship of reading skills to the ability to solve arithmetic problems. By comparing good achievers in arithmetical problem solving with the poor achievers he found the former superior to the latter in the specific abilities that might be presumed to enter into this specialized area, while no region of significance was found in those abilities that are of general nature such as reading to predict outcomes, knowledge of general information and ability to recognize the central thought of a paragraph. Treacy concluded that in helping pupils through reading instruction to improve their ability to solve arithmetical problems "reading should be regarded as a composite of specialized skills rather than as a generalized ability."

These and other studies[3] undertaken along a similar line give an indication that the ability to engage successfully in a particular subject matter area is contingent to some degree upon skills that may be the same or similar to those found in another area. To a larger degree, however, is the ability to comprehend dependent upon abilities that are unique to the field studied.

With light as indicated above upon the problem of specific and general factors in reading comprehension several supplementary issues present themselves. In the first place we have the question of the extent to which general and specific factors enter into ultimate achievement in each content field. Obviously if achievement in general science or geography is contingent largely upon the skills related to general reading comprehension, then there is little need to be concerned with the development of the more specialized skills, regardless of their relation to the more generalized ones. If, on the other hand, achievement requires an application of the abilities that can be developed effectively only within the confines of a particular content field, the responsibility of each teacher in relation to instruction in reading becomes clear and specific.

Providing there is a specificity in factors in reading comprehension, a third problem arises. That is, what reading skills and abilities are related to adequate comprehension in each subject-matter area, and what is the relative order of their importance? It is apparent that the answer to this question is imperative if each teacher is to deal adequately with the reading that is a part of the subject being taught.

[2]John P. Treacy, "The Relationship of Reading Skills to the Ability to Solve Arithmetic Problems," Journal of Educational Research, XXXVIII (October, 1944), pp. 86-96.

[3]Elden Bond, Tenth Grade Abilities and Achievement, Contributions to Education, No. 813 (New York: Teachers College, Columbia University, 1940).

Eva Bond, Reading and Ninth Grade Achievement, Contributions to Education, No. 756 (New York: Teachers College, Columbia University, 1938).

Joseph Dewey, "The Acquisition of Facts as a Measure of Reading Comprehension," Elementary School Journal, XXXV (January, 1935), pp. 346-48.

B. T. Ritter, and W. T. Lofland, "The Relation Between Reading Ability as Measured by Certain Standardized Tests and the Ability Required in the Interpretation of Printed Matter Involving Reason," Elementary School Journal, XXIV (March, 1924), pp. 529-46.

Esther Swenson, The Relation of Ability to Read Material of the Type Used in Studying Science to Eighth Grade Achievement (Unpublished Master's thesis, University of Minnesota, 1938).

To provide further understanding on the problem of general and specific factors in reading comprehension, as well as to throw light upon the two supplementary issues mentioned above, the writer undertook a study of the relationships that existed between general reading comprehension and reading comprehension in a specific subject matter area as one means of providing a basis for allocating the responsibilities related to the development of effective reading and study abilities. In brief, these three purposes stood out:

1. To determine the relationship between scores on tests purporting to measure abilities related to comprehension in a specific subject-matter area and scores on a test designed to measure a more general type of reading comprehension.

2. To determine the extent to which reading comprehension of both the general and specific types enters into an informational type of achievement in a specific subject-matter area.

3. To determine the relative importance of certain factors assumed to be components of reading comprehension in a specific subject-matter area.

PROCEDURES USED IN THE STUDY

Because the field of social studies is such a vital one in general education, and because more nearly adequate research instruments appeared to be available for the purpose of the investigation, this field was selected for study. Data were secured by means of a series of tests appraising achievement in general reading comprehension, certain aspects of reading comprehension in the social studies, and informational achievement in the social studies. The tests used are listed below:

I. General reading comprehension-Cooperative Test Service, English Test C1: Reading Comprehension, Form Q, purporting to measure
   1. General vocabulary
   2. Speed of comprehension
   3. Level of comprehension

II. Certain aspects of reading comprehension in the social studies-Progressive Education Association, Application of Principles in Social Studies, 1.5, purporting to measure:
   1. Ability to see logical relations
   2. Ability to evaluate arguments

   Cooperative Test Service, Test of Social Studies Abilities, Experimental Form Q, purporting to measure:
   1. Knowledge of sources
   2. Ability to organize
   3. Ability to interpret
   4. Ability to apply generalizations

   Cooperative Test Service, Test of General Proficiency in the Field of Social Studies, Form QR, (Terms and concepts subtests only)

III. Informational achievement in the social studies-Cooperative Test Service, Survey Test in the Social Studies, Form O, purporting to measure "achievement of a topical content nature in the several social studies areas."

These tests, requiring a total testing time of approximately five hours per pupil, were administered to 242 eleventh grade pupils in a typical eastern high school. Complete data were secured for 200 cases, and all computations were made on this basis. By subjecting the data to statistical analysis which provided coefficients of correlation and partial regression coefficients, findings were secured which are summarized below:

SUMMARY OF FINDINGS

1. A coefficient of correlation of .79 was found to exist between the measures of reading comprehension of a specific nature and general reading comprehension. This was reduced to .75 when the effect of intelligence was partialled out.

2. The contributions to informational achievement in the social studies of a team composed

of general and specific reading comprehension are indicated in the following beta weights (partial regression coefficients in standard score form):

general reading comprehension - .410
specific reading comprehension - .401

3. The relative importance of certain factors assumed to be components of reading comprehension in the social studies are indicated in the beta weights presented below:

social studies vocabulary	.432
general reading vocabulary	.396
ability to interpret	.277
ability to obtain facts	.277
ability to organize	.274
ability to perceive logical relations	.228
ability to apply generalizations	.166
ability to evaluate arguments	.127

CONCLUSIONS

Within the limitations of the study, the following conclusions appear to be valid:

1. The extent of relationship that exists between tests of general reading comprehension and reading comprehension in a specific subject-matter area makes it appear that, in general, ability to read material of a general informative type is associated with the ability to read a type of material more directly related to a specific content area.

2. The absence of a near perfect correlation between measures of general and specific reading comprehension provides evidence that there exists a high degree of specificity in the factors relating to reading comprehension in a specific subject-matter area.

3. The abilities measured by tests of general and specific reading comprehension appear to be present to an equal extent on an informative test of achievement in the social studies.

4. A knowledge of word meanings of both a general and specific nature, the ability to interpret, to obtain facts, and to organize appear to contribute most to the ability to comprehend social studies material.

EDUCATIONAL IMPLICATIONS

On the basis of the conclusions presented above, several pertinent educational implications may be made. In the first place, the reading teacher or the teacher invested with the responsibility of caring for the reading needs of pupils may make a material contribution toward giving a type of training that will operate in a functional manner in the social studies field, at least. Moreover, every classroom teacher has the direct responsibility for developing those reading skills and abilities essential for adequate comprehension within his particular area of instruction. This is in addition to applying to his content field and making functional those skills and abilities being developed by teachers in other areas of instruction.

One should not be misled by the apparent high correlation of .78 between the measures of general and specific reading comprehension. In interpreting any coefficient of correlation, one should keep in mind the purpose for which the r is computed. An r computed for the purpose of merely determining the degree of commonality between two factors is quite different in interpretation from the same r when it is to be used for predictive purposes, for in the latter situation the relation between the two factors must be a great deal higher than in the former. Though for this case the r is not computed for the purpose of prediction, a similar interpretation should be made. That is, we are interested in knowing how well a particular pupil will be able to achieve on a test of comprehension in a specific area when his achievement is known on a test of general reading comprehension, and vice versa. One way of interpreting a coefficient of correlation is by its "fore-

casting efficiency" or coefficient of dependability (E).[4] When one applies the formula for E, the efficiency of the obtained r is found to be .387 per cent. In other words, either measure (general or specific reading comprehension) is less than .50 per cent efficient in predicting scores on the other measure. Hence, one may conclude that though the correlation between scores on the two factors is sufficient to say that a high degree of commonality exists between them, it is not high enough to dismiss the possibility that there are a great number of pupils in the distribution who might profit from a specific type of reading instruction.

The intercorrelations between the measures of the several factors presumed to be components of reading comprehension (ability to obtain facts, ability to evaluate arguments, ability to interpret, etc.) in the subject-matter area studied indicated positive though moderately low relationships. Among the eight factors under consideration the r's extended between .275 and .785 with only several over .60. In other words, though the factors are positively related, possessing the ability to organize, for example, does not necessarily infer a high degree of ability to perceive logical relations or to evaluate arguments. This fact holds several implications of significance to the test maker and to the test user. First, it makes it appear that an adequate test of reading comprehension should be one that requires a number of different types of responses. That is, the test should appraise a number of different abilities rather than one or several, as is the practice of many tests. For example, in a survey-type test such abilities as the following should be evaluated: ability to infer, ability to organize, ability to select the main idea in a paragraph or longer selection, ability to select important details, ability to judge the relevancy of material, and the like. It is apparent that such an appraisal would be an attempt to get at the thinking side of reading -- a consideration receiving much recognition by those who are concerned with the semantic implications of reading.

In the second place, there appears to be a definite need for reading tests that place more emphasis upon diagnosis. It is not enough to say that a pupil comprehends thus and so in general, but rather, that he comprehends well or poorly in history, literature, or algebra. Such a demand necessitates a delineation of the reading purposes or abilities essential for adequate comprehansion in each area of experience, and then the construction of tests or subtests that will appraise growth and achievement in these specific abilities. Knowing, for example, that adequate comprehension in history requires the abilities, among others, of securing information, of organizing data, of interpreting findings, and of understanding the specialized concepts and terms, permits one to devise an instrument that will appraise strengths and weaknesses. These strengths can then be translated into pupil needs, which, in turn, furnish the basis for adequate instruction.

This study provides, at least, one technique for determining the skills that are essential to achievement in a particular content area. Other procedures might be those of using expert opinion, or of analyzing assignments, texts, workbooks, manuals, etc. for the specific skills demanded. It would be assumed that to the extent to which all three approaches were used, the more nearly adequate the list would be. However, the implication is clear to all content area teachers that they must be aware of the specific reading skills, abilities, and attitudes demanded by their course, their assignments, or their units of work. Knowing these, they must then hold themselves accountable for developing these specialized abilities, or for seeing that transfer is made from other areas where similar skills are demanded. The statement that every teacher is a teacher of reading is no idle dictum.

SUMMARY

On the basis of the study described there appears to be a positive relation between the ability to engage in a "general" type of reading and the ability to read in a specialized area. This relation is not so high, however, as to dismiss the possibility that a great number of pupils can profit from instruction in the specialized skills and abilities that go into reading in a particular content area. The need for each teacher to be cognizant of the skills demanded by the area in which he is instructing is pointed out. Only in this way can he be sure that he is meeting children's needs.

[4] Henry E. Garrett, Statistics in Psychology and Education (New York: Longmans, Green and Co., 1940), pp. 344-46.

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THE APPEAL OF INFORMATION ABOUT OCCUPATIONS

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INTRODUCTION

The entire experiment of which this paper treats only a part was conducted in a New Jersey high school in a city which is largely industrial in its vocational composition. One senior high school served the students.

The subjects included were 166 twelfth grade boys. It was decided to use only this classification of students to secure as much homogeneity as possible. It was thought, too, that information about occupations with which the study is, in part, concerned would be especially valuable for boys either about to enter vocational life or to continue their training in other institutions.

PROBLEM

Two problems are treated in this analysis. They may be briefly stated as follows: How can occupations be investigated by students in a reasonably typical educational situation? And, do twelfth grade boys who are interested in investigating information about occupations have characteristics different from those who are not? From the analysis, interpretations are made.

PROCEDURE

At the beginning of a semester, the Cleeton Vocational Interest Inventory[1] was administered to the boys. Subsequently, the inventories were scored and the boys at periodic intervals were called into the counseling room either singly or in small groups. A brief talk was given them concerning the place of interest in choosing and planning for a suitable vocational objective. In substance, it consisted of the following explanation.

> "Before you leave school to enter the occupational world or a higher educational institution, it is important that you learn about kinds of work which may be most suitable for you. When anyone anticipates taking an important step, he makes inquiry about the venture so that he may be guided by the findings. When that step is concerned with such an important matter as one's future career, the significance of the findings is increased. Information is available which, if intelligently used, may be of great value in eliminating any prejudice about an occupation which might be suitable in every other respect. Some of you have, no doubt, made your plans. If they are sound, you will be reassured regarding your decision. If they are not, you may be prompted to make such changes which are desirable in the light of the findings.
>
> You will be given an opportunity to explore your interests by investigating certain occupations suggested from the responses you gave on the inventory. It is hoped that the experience and the information you gain will be of benefit to you in guiding you in your plans for the future."

[1]Glen U. Cleeton, The Cleeton Vocational Interest Inventory (Bloomington, Illinois; McKnight and McKnight, 1937); revised edition 1943. The original edition was used in this study. This inventory rather than any other was selected for a number of reasons. It was relatively new and not a great deal was known about its behavior. More apropos of the requirements of this particular phase of the whole investigation concerns its construction. It is designed so that an area of "strongest interest" is segregated from other areas and liked occupations which are listed in the isolated category can then be readily selected for the analysis described in this paper.

METHOD OF INVESTIGATING OCCUPATIONS

The first problem concerns a method of investigating occupations. Each boy was asked to select from his inventory, the first, second, and third[2] most liked occupation in that category of "vocational interests" in which he had made his highest point score.[3] Inspection of the markings revealed that three was the largest number of pluses in the high[4] category of all the boys. A record of the occupations so selected was kept. Copies of a standard mimeographed outline form[5] were furnished each student and oral instructions regarding the procedure for securing the necessary information for performing the assignments were given.

After each student had been instructed in this manner, he was called into the counseling room for conference several times during the semester, either singly or along with one or two others. The progress of each student's work was discussed and a record of visits was noted. During these visits, books, pamphlets, mimeographed material, leaflets, abstracts, and the like, apropos of the occupations selected for study were charged out to him. Reading materials were quite extensive, the counseling room being well stocked with both general information about occupations and data concerning local fields of work.

CHARACTERISTICS OF THE BOYS

Of the 166 boys who had started on the projects, 106 carried through the assignment to completion by the end of the semester. These were called Class I. Sixty boys did not complete the projects. These were called Class II. The second problem is to ascertain what differences there were in the characteristics of the boys of the two classes.

Average scores on the inventory. - It will be observed from Table I that Class I had the higher mean score (number of items marked as "liked"). The difference between the two means is 3.1, significant at the 2 per cent level.[6] The difference between the standard deviations, 1.3, is not significant. It appears from these data that higher scores on the inventory tended to be associated with greater desire for information and greater effort expended to carry the investigation to completion.

Background factors. - By applying the chi-square test, no significant differences were found between the two classes in half-grade classification, high school course pursued, and college expectancy.

[2]The inventory requires that only one occupation be marked as the most liked in each category.

[3]The 1943 edition uses percentile score as a basis for estimating strength of "vocational interests".

[4]The phrase "as well as zeros in the low. . ." should be added. The study of disliked occupations, however, is extraneous to the scope of this paper.

[5](See end of article).

[6]The "t" value is 2.4.

TABLE I

SCORES OF STUDENTS IN CLASS I AND CLASS II

BASED ON AVERAGES

Score	Frequency		Percentile Rank of Score	
	Class I	Class II	Class I	Class II
58	2	0	99	
53	4	1	96	99
48	6	2	92	97
43	22	5	78	91
38	18	13	59	76
33	21	13	41	54
28	23	17	20	29
23	8	8	6	8
18	1	0	1	0.8
13	1	1	0.5	0.8
Total	106	60		
Mean	35.8	32.7		
Standard Deviation	8.7	7.4		

Tabel II reveals a comparison between the two classes in age, scholastic aptitude, achievement, and number of job experiences. The only significant difference is in academic achievement. Classes I had a mean 2.29 percentage points higher than Class II. This difference, yielding a "t" value of 2.76, is significant at the 1 per cent level. None of the standard deviations is significant.

TABLE II

CHRONOLOGICAL AGE (IN MONTHS)

SCHOLASTIC APTITUDE

AVERAGE PASSING ACHIEVEMENT MARK

NUMBER OF JOB EXPERIENCES

Trait	Class I		Class II		Difference[7]		t[8]	
	M	S	M	S	M	S	M	S
Age in Months	207.08	9.38	205.70	10.29	1.38	0.91	0.87	0.80
Scholastic Aptitude[9]	106.08	9.86	105.30	8.59	0.78	1.27	0.51	1.22
Achievement[10]	80.92	5.26	78.63	4.88	2.29	0.38	2.76	0.67
Number of job experiences	2.09	1.02	2.18	1.08	0.09	1.06	0.53	0.43

[7]Between means and between standard deviations.

[8]Ratio of the difference between means and its standard error and of the difference between standard deviations and its standard error.

[9]Based on the Otis Quick-Scoring tests. The scores as shown are not the same as "intelligence quotients".

[10]Based on six semesters of passing work in academic subjects of the high school for IV-1 students and on seven semesters for IV-2 students.

SUMMARY

One hundred and sixty-six twelfth grade boys in a single high school were given the Cleeton Vocational Interest Inventory at the beginning of a semester.

From the responses, certain occupations were selected about which information was gleaned from various sources by the students according to a standard outline form. These projects were completed, with help, by 106 of the students. Sixty of the boys did not finish the assignment.

The first group of boys (Class I) differed from the second (Class II) in the scores (number of pluses) obtained on the inventory, the former scoring significantly higher. The members of Class I also had made significantly higher marks in their academic subjects throughout their high school career.

INTERPRETATION

Of all possible methods, whether the most effective one was used for the study of the information is an important consideration. A list of possible methods would, no doubt, vary in more or less detail with the person proposing it, but from most concrete to most abstract methods it would contain essentially these:

1. Actually performing work processes on the job.
2. Performing simulated job experiences in school.
3. Visiting occupational establishments and observing and talking to workers.
4. Reading about occupations.
5. Thinking about occupations without being in possession of most of the facts.

Obviously, the first method could not have been used in this investigation as the boys were in a reasonably typical educational situation. The second, too, must be eliminated since the school had not set up and could not hope to set up the comprehensive try-out program necessary to encompass all the vocational preferences of these students. As these methods are probably the most concrete, let us assume, for the moment that one or the other might have been employed. It would not necessarily follow that the best method for studying information about occupations had been utilized. True, students would learn work processes, but if this learning were not supplemented with other information about occupations (e.g. kind and amount of training needed, range of wages paid, etc.) one may well doubt that the most effective method had been employed. The third could be used to a limited degree for the reason that a limited number of occupations was to be found in the community. The fourth method, together with the outlining procedure was chosen as the most practical in the light of the conditions of the investigation. The literature about occupations especially within recent years has become extensive enough to embrace facts about most of the common occupations. Moreover, students were encouraged to supplement their readings with information obtained from observing workers, and by talking to them, to parents, and to teachers. It appears, therefore, that the best possible method was employed.

It seems that a more comprehensive combination of liked occupations could have been chosen for study. If the same inventory is used, the following combination is perhaps more adequate: three most liked occupations in the high category, two most liked occupations in the second high and the most liked occupation in the third high. Less likelihood of a suitable vocational escaping study would obtain under this arrangement.[11]

[11] To provide a fully satisfactory answer to this problem would require a thorough consideration of the raison d'etre of vocational interest inventories. Suffice it to say that the technique came into being on the theory that a sound instrument provides a more trustworthy estimate of a suitable occupation or vocational field from the standpoint of interest than the expression of a preference because many underlying factors are taken into account in an inventory which are associated with an occupation or with a worker in an occupation.

It appears that the teacher of occupations has a problem with respect to the motivation of low achievers which is little different from that of teachers of other academic subjects. The sometimes heard opinion that "students are not interested in the study of occupations" is probably no more true than a similar opinion about other subjects. As a matter of fact, it might be less true if full opportunity for individualized work were taken, and it must be granted that such occasion is ever present in the study of vocations. It is quite likely that the projects lost some of their appeal for certain students because of the inclusion of most disliked occupations. Although there may be value in requiring that such occupations be analyzed, they should unquestionably be given less emphasis. With these eliminated for thorough study and assignments individualized according to the interests of students, the study of occupations could become a more significant activity.

OUTLINE FOR THE STUDY OF AN OCCUPATION

Student's Name_____ Occupation _____

I. How important is the work? Illustrate.

II. What does the worker do? List his duties or outline a day's work.

III. What qualifications does he need? For entrance into the work? (abilities, character traits, physical qualifications, skills, etc., schooling, special training, important subjects).

For progress in the work?

IV. What are the conditions surrounding the work and the worker? (working environment, people with whom he deals, earnings, etc.)

V. What do you consider the advantages and the disadvantages in this work?

ON ESTABLISHING NORMS IN A LARGE CITY SYSTEM

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For the past six years there has been administered annually to all the children aged 6-10 to 7-10 years in the City of Winnipeg, the California Test of Mental Maturity, Primary Form. During the first four years the unabridged form was used, while during the 1945 administration the short form was used. The purpose of this paper is to study the nature of the variation among schools of the intelligence quotients derived from the 1945 administration, and to establish a norm for the school system which will be a more accurate estimate of the average intelligence quotient than the simple unweighted mean of the distribution.

It is customary to have the test administered by the primary teacher in each of the forty-six elementary schools, and this administration is carried out with as much uniformity as it is possible to obtain under these conditions. There is, however, a wide variation among schools in both means and standard deviations. Comparisons between schools, and with the population norms, then, must be made with due regard to this variation.

One of the questions that arises is whether or not it is permissible to pool the results of schools indiscriminately in order to establish a norm for the system as a whole. To combine the results of individual sub-groups for statistical purposes with a view to examining them with respect to significance among their means, it is necessary first to establish whether or not the standard deviations are homogeneous within the groups.

To test the assumption of the homogeneity of standard deviations or variances among schools we make use of the L_1 test (5). The hypothesis we wish to test is that there is no significant difference in variance among k samples of size n, and the criterion is

$$L_1 = \prod_s^k \left(\frac{N}{n_s}\right)^{\frac{n_s}{N}} \prod_s^k \left\{\frac{\theta_s'}{\sum_s^k \theta_s'}\right\}^{\frac{n_s}{N}}$$

where $\prod$ denotes the product, θ_s' denotes the within school sum of squares for the s-th school, and $N = \Sigma n_s$. We then refer to Nayer's tables of the L_1 distribution (3) with $k = 46$ and $n = f_{s2} = \left[\frac{1}{n}\left\{\frac{1}{\Sigma f_s}\right\}\right]^{-1}$ where n - 1 denotes the degrees of freedom associated with θ_s' in the s-th school (1). The rule to be followed is to reject the hypothesis tested at a given level of significance, when the calculated value of L_1 is less than the corresponding point given in the table. The basic data and the calculation of the L_1 test are shown in Tables I and II.

Table I shows the frequencies, means, standard deviations, and, in deviation form, the sums and sums of squares for the forty-six schools upon which this study is based. Table II shows the calculation of the L_1 test for homogeneity of variance.

Entering Nayer's tables with the obtained L_1 of .897 and d.f. = 36 - 1 = 35, we must obviously reject the hypothesis that the schools are homogeneous as regards variability, and conclude that the heterogeneity thus established must have a distinct bearing upon the general mean of the school system. Because of the heterogeneity of the data it would be inefficient to set up a parameter value for the City as a whole on the basis of the ordinary weighted mean.

However, because of the practical need of establishing some one norm or value, the problem arises as to what might be the measure of central tendency and variability for the school system as a whole. In other words, can we obtain an unbiased estimate which would be the best estimate of the average intelligence quotient for this city system?

*The writer is indebted to Dr. Palmer O. Johnson, of the University of Minnesota, for his assistance in formulating this problem.

TABLE I

FREQUENCIES, MEANS, STANDARD DEVIATIONS, SUMS AND SUMS OF SQUARES OF INTELLIGENCE QUOTIENTS IN FORTY-SIX SCHOOLS IN CITY OF WINNIPEG

SCHOOL	N	M	S. D.	SX'*	$S(X')^2$
1	47	102.00	13.09	517	6009
2	39	89.05	14.13	327	3070
3	30	89.80	11.74	257	2367
4	59	95.90	12.11	577	5989
5	15	95.00	19.22	144	1604
6	24	100.33	12.88	256	2890
7	29	99.60	15.35	305	3481
8	28	88.60	17.68	233	2289
9	34	93.60	14.79	317	3253
10	53	97.70	17.91	537	6121
11	70	98.71	14.95	724	8114
12	56	99.90	14.39	593	6743
13	51	91.66	12.94	455	4401
14	56	98.66	12.26	579	6323
15	15	98.00	12.41	153	1653
16	60	92.30	12.64	544	5316
17	82	93.00	13.83	755	7579
18	60	90.66	15.49	544	5508
19	20	89.50	17.06	170	1678
20	67	96.50	12.49	663	6979
21	47	86.80	15.19	374	3410
22	109	100.25	13.45	1161	13155
23	66	97.98	14.01	673	7381
24	25	92.80	9.35	229	2185
25	71	99.20	12.72	741	8193
26	34	96.41	14.39	336	3602
27	50	86.70	13.76	397	3531
28	80	96.43	14.21	791	8467
29	15	90.30	7.67	130	1162
30	45	102.60	14.80	500	5950
31	39	94.94	15.47	374	3960
32	54	99.96	13.45	572	6450
33	40	112.60	20.62	525	7571
34	37	97.50	13.81	358	3746
35	25	103.00	11.04	280	3258
36	56	103.40	10.88	632	7398
37	56	113.30	15.90	742	10398
38	21	95.60	16.67	204	2218
39	62	105.00	14.38	719	8851
40	32	98.40	10.55	329	3525
41	69	100.80	16.94	743	8793
42	48	102.20	11.30	530	6098
43	78	104.90	14.06	903	11071
44	24	94.94	12.74	230	2360
45	47	104.97	12.06	545	6593
46	16	105.40	14.55	187	2321

*$X' = \frac{X - 52}{5}$

TABLE II

THE CALCULATION OF THE L_1 TEST OF HOMOGENEITY OF VARIANCE

SCHOOL	n_s	$\log n_s$	$n_s \log n_s$	$\left\{\frac{N\Sigma(x^2)-(\Sigma x)^2}{N}\right\}$ θ'_s	$\log \theta'_s$	$n_s \log \theta'_s$
1	47	1.6720979	78.5886013	322.0000	2.5078559	117.8692273
2	39	1.5910646	62.0515194	311.4359	2.4933744	97.2416016
3	30	1.4771213	44.3136390	165.3667	2.2194567	66.5537010
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
46	16	1.2041200	19.2659200	135.4375	2.1317469	34.1079604
TOTALS	2141		3665.0499801	17041.3577		5493.0579667

$$\log L_1 = \log 2141 - \frac{1}{2141}(3665.0499801) + \frac{1}{2141}(5493.0579667) - \log 17041.3577$$

$$= \bar{1}.95293$$

$$L_1 = .897$$

A method of weighting the sub-group means has been suggested by Neyman (4). This method has been adapted for the data in this study. Care should be taken, however, to consider the possibility that the means and standard deviations of the schools in this system are not correlated. The correlation between the means and standard deviations was found to be .097, which does not differ significantly from zero. It seemed appropriate, therefore, to make use of the method suggested by Neyman, of combining the means of the schools in order to take into account the variability among schools in frequency and the standard deviations within schools.

The formula suggested by the work of Neyman for weighting the means of the sub-groups, and thereby establishing an unbiased measure of central tendency, is, using an adapted notation, as follows:

$$M_u = \frac{N_1 \sigma_1 \bar{X}_1 + N_2 \sigma_2 \bar{X}_2 + \ldots\ldots + N_n \sigma_n \bar{X}_n}{\Sigma N_n \sigma_n} \quad \ldots\ldots (1)$$

where M_u is the unbiased estimate of the mean; N_1, N_2, ...N_n, are the frequencies of the separate schools; S_1, S_2, ...S_n, are the unbiased estimates of σ_1, σ_2, ... σ_n, or the standard deviations of the schools; and $\Sigma N_n \sigma_n$ is the sum of the weighting factors in the numerator.

For the data presented above, M_u = 99.38 I. Q. points. Thus the unbiased estimate of the mean for the system as a whole does not differ significantly from a hypothecated mean of 100 I. Q. points for the population of first grade children with which this study is concerned.

An unbiased estimate of the population variance may be obtained by means of the formula suggested by Hoel (2). If k sample variances are available,

$$\hat{\sigma}^2 = \frac{n_1 s_1^2 + n_2 s_2^2 + \ldots\ldots\ldots n_k s_k^2}{n_1 + n_2 + \ldots\ldots\ldots n_k - k} \quad \ldots\ldots\ldots (2)$$

where $\hat{\sigma}^2$ = the unbiased estimate of the parameter value; s_1^2, s_2^2, ...s_k^2 are the sample estimates of the population variance; n_1, n_2, ... n_k are the frequencies in the respective schools. This formula "is particularly useful when several sets of data are available for which the variability can be assumed to be constant, but for which the means vary more than could be reasonably attributed to chance. If such sets of data were combined into one set and the variance of the entire set used as an estimate of the population variance, the result would be to over-estimate the value of σ^2. However, if one calculates the variance of each set and combines as in formula 2, the result will be unbiased."(2) The unbiased estimate of the standard deviation for the data of this study was 14.26 I.Q. points.

In endeavoring to establish norms on the basis of city or state-wide testing programs, the importance of testing basic assumptions before combining data cannot be overstressed. The efficient use of statistical tools in the solution of problems of this type is founded upon an adequate analysis of the data to determine the extent to which the basic assumptions are justified, and any interpretation of data thus analyzed can be fairly evaluated in the light of the revelations of the analysis.

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THE READING HABITS OF SUPERIOR COLLEGE STUDENTS

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This investigation aims to determine to what extent a group of college students with superior scholarship ratings possess efficient reading habits. By efficient reading is meant the ability to read rapidly and with rhythmic, continuous eye-movements. Efficient reading is frequently presumed to be necessary for successful reading and scholastic success. Thus Bowen writes: "Careful selections and rapid reading are essential to the adult who aspires to be 'well read' today." She cites 325 to 425 words per minute as a criterion "by which to judge an individual's (college student's) rate."[1] Cole, in comparing the eye-movements of a good reader with those of a poor reader, concludes, in part, that "the good reader is good because he uses few fixations, rarely makes a regression, and hits the beginning of each line accurately."[2] A manual for college students states: "There is a definite relationship between scholastic aptitude and reading efficiency."[3] How definite is this relationship?

SELECTION OF SUBJECTS

A letter was sent to the 42 members of the junior class consisting of 206 members of the College for Women of the University of Pennsylvania in the second semester of the academic year 1946-1947 who were eligible for election to Phi Beta Kappa, requesting their participation in the study. These were the leading 42 juniors as judged by college grades. Of these, 22 volunteered and constitute the subjects of this investigation. Ten of these were subsequently elected to Phi Beta Kappa, and it is reasonable to believe others of them will be elected in their senior year. Chronological ages ranged from 19 to 21 years. Average scholarship ratings were calculated for all of the 22 subjects, and yielded a mean of 4.4 and a standard deviation of .03 (5.0 designating "A", 4.0 designating "B", etc.).

TESTING PROCEDURE

The subjects were examined, singly in some cases, more frequently in pairs. The following tests were administered in accordance with directions appearing in the respective manuals.

1. Iowa Silent Reading Tests, New Edition, Advanced Test: Form Am, Test 1, Parts A and B (rate-comprehension). (World Book Co.)
2. Traxler High School Reading Test (for Grades 10, 11 and 12), Form A, Part I (reading rate and story comprehension). (Public School Publishing Co.)
3. Minnesota Speed of Reading Test for College Students, Form A. (University of Minnesota Press)
4. Study-Habits Inventory (Stanford University Press)
5. Metronoscope, Roll No. 2125, "Mr. Vinegar," Roll No. 2483, "Creating New Colors", and Roll No. 2485, "Little Bugs and Big Business". (American Optical Co.)

[1] G. Bowen, "Speed for Today's Reading Needs," Teachers' Service Bulletin in Reading (New York: Macmillan Co., 1946).

[2] L. Cole, The Improvement of Reading (New York: Farrar & Rinehart, 1938), p. 56.

[3] R. W. Frederick, et al, A Guide to College Study (New York: Appleton-Century Co., 1947), p. 81.

6. Ophthalmograph, High School and College, Forms A and D. (American Optical Co.)

The first three tests listed are paper-and-pencil tests of silent reading. It should be pointed out that the Minnesota Speed Test is a test of comprehension as well as speed. It consists of a series of brief unrelated paragraphs, so that a score in terms of words per minute (appropriately calculated only where extended, continued reading matter is presented) cannot properly be derived.

The fourth test is a short self-rating inventory of selected study habits.

The fifth test employs a machine into which rolls containing factual reading matter are inserted. Through a shutter arrangement, one phrase is exposed at a time. The speed of exposure is regulated by a dial. It is ordinarily used as a pacing device to assist in speeding up reading. A comprehension test has been prepared for each roll consisting of ten questions about equally divided between completion items and alternative-response items. Rolls were used in the order listed above. The first roll, consisting of comparatively simple reading matter, was used for practice and was not followed by a test. The second roll was run at the rate of 300 words per minute and the third roll at the rate of 367 words per minute. Comprehension tests followed in both instances. These two rolls were judged to possess equal complexity and were deemed appropriate for subjects of high intellectual caliber.

The sixth test was administered twice with two different reading selections. The subjects sat before a camera equipped to photograph eye-movements, read a short selection, then answered ten true-false questions. Two usable reading graphs were obtained for each of 17 subjects and one was obtained for each of the remaining 5 subjects.

SPEED OF READING

Words per minute. - Table I presents the distribution of the 22 subjects according to their speed of reading. In connection with any of the tests less than half of the subjects read faster than 325 words per minute. Bowen, as already mentioned (reportedly basing her figures on eight studies), gives a range of from 325 to 425 as typical of the rate for college students.[4]

TABLE I
DISTRIBUTION OF SUBJECTS ACCORDING TO RATE OF READING UPON FOUR TESTS

Words per minute	Iowa	Traxler	Ophthalmograph I	Ophthalmograph II
500-524	....	1	....	....
475-499	1	....	....	....
450-474	1	3	....	1
425-449	2	1	1	0
400-424	....	....	....	....
375-399	1	2	....	1
350-374	3	2	....	4
325-349	2	0	1	2
300-324	2	3	3	3
275-299	3	3	....	1
250-274	1	2	7	4
225-249	3	4	4	1
200-224	1	0	2	0
175-199	....	....	1	1
150-174	2	....	....	....
125-149	....	....	....	1
Mean	309	335	269	305
s	85.7	88.0	53.8	69.8

[4] loc. cit.

TABLE II

INTERCORRELATIONS BETWEEN MEASURES OF SCHOLARSHIP, READING SPEED, EYE MOVEMENTS, STUDY HABITS, AND READING COMPREHENSION

	Iowa speed	Traxler speed	Minnesota speed and comprehension	Ophthalmograph speed I	Opthalmograph speed II	Span of recognition I	Span of recognition II	Regressions I	Regressions II	Study habits	Iowa comprehension	Traxler comprehension	Metronoscope comprehension I	Metronoscope comprehension II
Traxler speed	.83													
Minnesota speed and comprehension	.12	.58												
Ophthalmograph speed I	-.02	.09	-.09											
Ophthalmograph speed II	.61	.37	-.09	.53										
Span of recognition I	-.02	-.69	-.22	.08	.49									
Span of recognition II	-.02	.08	.18	.65	.49	.74								
Regressions I	.05	-.07	.22	-.46	-.28	-.96	-.46							
Regressions II	.00	-.26	.37	-.96	-.10	-.79	-.69	.35						
Study habits	.19	.18	.40	-.01	.03	.05	.06	.42	-.27					
Iowa comprehension	.08	.14	.30	-.22	.21	-.32	-.53	.11	.36	.22				
Traxler comprehension	-.01	.20	.05	.01	.08	.03	-.01	.01	-.26	.08	.37			
Metronoscope comprehension I	.12	.00	.10	.04	.01	.14	.00	-.27	-.07	.23	.05	-.01		
Metronoscope comprehension II	.00	.19	-.01	.00	.08	.27	.00	-.58	.00	.14	-.12	-.13	.61	
Accuracy of comprehension (Iowa & Traxler)	.01	-.21	.10	-.12	-.11	-.17	-.28	-.10	.03	.25	.75	.01	-.41	-.54
Scholarship	.33	.24	.42	.03	.09	-.12	-.21	.20	.00	.01	.24	.49	.07	-.15

Two of the subjects exceeded 325 words per minute upon the first ophthalmograph selection, and eleven exceeded that rate upon the second ophthalmograph selection. The manufacturers of this instrument give 325 words per minute as the norm for college students.[5] Reference should be made in passing to a fact pointed out by others, namely, that the standard ophthalmograph selections do not yield reliable measures of rate. The reading of the second ophthalmograph card increased an average of 28.8 words per minute over the reading of the first card. The standard error being 14.9 words per minute, the difference is highly significant. There is less than one chance in a hundred that such a difference would occur if the first and second readings were similar experiences.

Percentile scores. - The most suitable available norms in studying college juniors for the Iowa, Traxler, and Minnesota tests are based, respectively, on performance of college freshmen, high school seniors, and college juniors. The number of subjects with scores above the 50th percentile in terms of rate derived from these most nearly appropriate norms were tabulated and, together with the range of percentile scores of all students, are summarized below:

Test	Range of percentile scores (all subjects)	Number of students out of 22 exceeding 50th percentile
Iowa	4-99	15
Traxler	45-99	21
Minnesota	15.48-97.62	17

In examining these figures, it must be borne in mind that the criteria are based upon the performance of younger and less experienced students with the exception of those used in connection with the Minnesota test. It should again be noted that the Minnesota scores measure comprehension as well as speed.

Effect upon comprehension of forced increase in speed. - After the practice run of a metronoscope roll, a roll was exposed at the speed of 300 words per minute and the comprehension test given, then the second roll was run at the increased speed of 367 words per minute, again followed by a test of comprehension.

The comprehension score of 14 of the 22 subjects dropped when the speed of presentation of the reading matter was thus increased. Comprehension scores decreased by a mean score of 1.2. Since the standard error is .35, the difference between the means of the two sets of comprehension scores is not statistically significant.

Summary. - This group of students read, in general, an average of between 300 and 350 words per minute, with approximately one-fifth of them reading above 400 words per minute and approximately another fifth reading below 250 words per minute. Roughly between one-ninth and one-third failed to exceed median speeds of high school seniors, college freshmen, and college juniors. Forcing the rate of reading to 367 words per minute resulted in loss in comprehension of over half of the subjects. While this loss in comprehension is not statistically significant, one is cautioned against generalizing that the reading speed of superior students possesses common characteristics or that it can be judged by an arbitrary standard.

EYE MOVEMENTS

Analysis of the graphs resulting from the photography of eye movements yields the following data:

	First test		Second test	
	Range	Mean	Range	Mean
Span of recognition (words)	.85-1.67	1.28	.83-2.08	1.35
Number of regressions	2-46	13.40	0-42	11.58

[5] The Ophthalmograph, The Metronoscope: Manual for Controlled Reading (Southbridge, Massachusetts: American Optical Co., 1937), p. 27.

The manufacturers of the ophthalmograph (American Optical Co.) give 1.25 words per fixation as the norm for college students and 10 regressions per 100 words as the norm for college students.[6] The means for the group are slightly above these norms. One-half of the subjects achieved the norm with respect to eye-span on the first test, and slightly less than two-thirds achieved it on the second test. One-half met or exceeded norms with respect to regressions on the first test, and slightly less than one-half met or exceeded the norms on the second test.[7]

Further information concerning the subjects' regressive tendencies was provided by their responses to the Study-Habits Inventory item: "I have to reread material several times--the words don't have much meaning the first time I go over them." Eight subjects responded "rarely or never", ten responded "sometimes", and four responded "often or always".

Summary. - The distribution of the subjects according to their eye movements while reading shows a wide spread of practice centering somewhat above norms established for college students.

PRONOUNCING WORDS IN SILENT READING

Pronunciation of words is an obvious deterrent both to speed and rhythm of silent reading. In responding to the Study-Habits Inventory item: "I pronounce the words to myself as I read", 12 subjects checked "rarely or never", 7 checked "sometimes", and 3 checked "often or always". The ophthalmograph films supply no evidence of lip-reading. What pronunciation takes place is doubtless occasional or, where frequent, of a suppressed nature.

Summary. - Pronunciation of words, so commonly associated with immature reading, is claimed as a consistent trait by about one-seventh of the subjects.

STUDY HABITS

Analysis of responses to the Study-Habits Inventory reveals considerable homogeneity, particularly in the following characteristics which are claimed by all but two subjects:

Does not often have trouble in picking out the important points in material read or studied.
Does not often have trouble in concentrating, avoiding day dreaming, or getting "warmed up" in the study process.

The author of the Inventory, Dr. C. Gilbert Wrenn, has kindly furnished information concerning the distribution of scores of the Inventory in its use among high scholarship students at Nebraska State Normal College. A comparison of measures follows:

Quartile	Nebraska State Normal College (high scholarship group)	Subjects of this study
Q3	64	89
Q2 (median)	46	74
Q1	23	39

All except two subjects (these two scored below the published mean score of 15 for college freshmen) of this study scored considerably above the first quartile figures established by the Nebraska data.

Summary. - The Study-Habits Inventory scores show a wide range, but with two exceptions,

[6] Loc. cit.

[7] To exceed the norm, a student must make a fewer number of regressions than ten per 100 words.

all scores are high. Ability to pick out important points in reading and ability to concentrate were the two traits attributed to themselves most unanimously by the subjects.

COMPREHENSION

Comprehension is an obvious function of reading efficiency and will be treated briefly.

Percentile scores. - Comprehension percentile scores upon the Iowa test ranged from 30 to 99 and upon the Traxler test from 21 to 97. As in the case of percentile scores of rate, these are based on norms for college freshmen and high school seniors respectively. Thirteen of the 22 subjects scored above the Iowa median, and 15 scored above the Traxler median.

Accuracy. - Percentages of accuracy upon all attempted comprehension items in the Iowa and Traxler tests range from 55 to 95. Assuming that an efficient reader grasps more than 75% of items attempted in carefully constructed tests such as these two, nine of the 22 subjects may be considered good readers when judged by such a standard. Twelve achieved or exceeded this standard on the metronoscope tests (averaging the scores of the two tests for each subject), and twelve also achieved or exceeded this standard on the ophthalmograph tests (again averaging the scores of the two tests for each subject).

Summary. - The wide spread among the subjects already reported with respect to rate is found also with respect to comprehension. Aside from a somewhat greater preponderance of very high scores, the distribution is not totally dissimilar to what might be expected from an unselected group of juniors attending a college with high standards of scholarship such as that attended by these subjects.

INTERCORRELATIONS

Table II presents intercorrelations (derived from the Product-Moment formula) between the various measures employed in the study. Aside from a fair degree of relationship between number of regressive eye movements and span of recognition (-.46 to -.96), consistent and strong relationships do not appear. Correlations between the various measures of comprehension and the various measures of reading efficiency are low (.00 to .58 with a median of 10.5).

Interpretation of the low correlations of measures with scholarship ratings must be made in the light of the high degree of homogeneity of the group with respect to scholarship--the basis on which the group was selected. Traxler comprehension scores correlate more closely with scholarship ratings than do any other scores (.49), followed closely by the Minnesota score which is based on comprehension and speed (.42).

OPINIONS OF THREE SUBJECTS ABOUT THEIR SLOW READING

Opinions were solicited by questionnaire from the seven "least efficient" readers among the subjects. Four replied, three of whom acknowledged their reading to be inefficient. All three testified they have felt handicapped as college students by their inability to read more rapidly, and that they would have welcomed as underclassmen an opportunity for receiving instruction in developing more efficient reading. All three of these slow-reading subjects stated, on the other hand, that they felt their leisurely habits of reading had enabled them to "absorb" and comprehend more content with a single reading than would be possible under conditions of rapid reading. One of the subjects testified it was possible "to retain material read this way for a longer period of time." Another stated: "It seems that one has more time (with slow reading) to correlate the things already learned with the new material in the reading." Despite the informal and sketchy nature of these opinions, they are not without relevance and importance.

CONCLUSIONS AND COMMENT

The evidence does not support the view that successful college students are uniformly efficient readers. Less than half of the group read faster than 325 words per minute (frequently and probably mistakenly cited as a norm for college students); one-half to two-thirds of the